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ON EARLY SALERNITAN SURGERY AND ESPECIALLY THE "BAMBERG SURGERY"

WITH AN ACCOUNT OF A PREVIOUSLY UNDESCRIBED MANUSCRIPT OF THE BAMBERG SURGERY IN THE POSSESSION OF DR. HARVEY CUSHING

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Students of Salernitan medicine had always assumed that the well-known Surgery of Master Roger was the one and only contribution of the early Salernitans to surgical literature, until in 1918 Sudhoff reported the discovery, in the Bamberg Royal Library, of two copies of an earlier surgical text. The work is anonymous, and for want of a better name Sudhoff called it the Bamberg Surgery. This little book, simpler, less comprehensive, and less orderly in its arrangement than that of Roger, is of special importance from the historical standpoint, because (as we shall see in detail) its contents are derived partly from the writings of Constantine and partly from pre-Salernitan sources, and thus it helps to understand how the Salernitans took over and adapted the surgical lore of their predecessors. One of the copies found by Sudhoff was written about the middle of the twelfth century. It is bound with a collection of certain brief Latin texts of Hippocrates, Philaretus, Theophilos Protospatharios and Galen, which the Salernitans inherited from the Dark Ages and often

treasured together in manuscript form, so that they ultimately survived (as the "Articella") in printed editions of the Renaissance period; in the same volume are also the so-called Passionarius Galeni and twenty-eight chapters of a "Gynaecia" of late Graeco-Roman origin. The Bamberg Surgery in its earliest known manuscript is thus associated with a collection of books of pre-Salernitan age. The second copy discovered by Sudhoff was written about one hundred years later. It is almost exactly like the first, the only significant difference being that the next to last paragraphs (on Hernia) have been rewritten and the last paragraph of Bamberg I (on Cupping) is omitted.

A third copy of the Bamberg Surgery exists, as Sudhoff pointed out, in the library of Gonville and Caius College, Cambridge, where it forms part of MS 400. This copy was written in the early thirteenth century. From photographs kindly sent from Cambridge, it appears that the Caius College text differs somewhat from those of Bamberg, chiefly by reason of condensation and the omission of numerous brief passages. Capita 80 to 87 (as numbered by Sudhoff) are missing. These paragraphs, as we shall see, contain a special treatise on blood letting, which was directly copied from an existing book; its omission from the Caius College text is undoubtedly due to the fact that the compiler was planning to include, as the next work in his volume, the first part of the Pantegni, translated by Constantine from Ali Abbas (Practica, Book 9), which also contains a discussion on blood letting. The Caius text contains practically no material not found in the other manuscripts.

A fourth and previously undescribed copy of the Bamberg Surgery has recently emerged from the obscurity of an Austrian monastery, and has been added, most appropriately, to the library of a great surgeon of the twentieth century, Dr. Harvey Cushing, in New Haven, Connecticut. This copy was written in the latter part of the twelfth century, and is therefore the earliest but one of the extant copies. A full description of the manuscript will be appended to the present paper (see p. 21). The present writer takes this occasion to express cordial thanks to Dr. Cushing for his generosity in making the manuscript available for study and for constant encouragement.

Its text resembles very closely that of the transcription given by Sudhoff of his Bamberg I. There are many minor verbal differences and occasional deviations of a sentence or two, but on the whole, the texts are remarkably similar, considering the way in which such manuscripts were handed down. With regard to passages differing in Bamberg I and II, the Cushing copy sometimes resembles one of them, sometimes the other.

The significant deviations of the Cushing text from that of Sudhoff are as follows (the paragraph numbers cited are those assigned by Sudhoff):

Cap. 17, on erysipelas arising in wounds is missing, as also in the Caius copy.

Cap. 25, containing a prescription for acne, is missing.

Cap. 26, containing a prescription of a dusting powder for wounds, is missing, as also in Caius and Bamberg II. (In the latter it is replaced by another prescription, for tetanus.)

Cap. 39, containing prescriptions of an irritant ointment and a corrosive powder, is missing, as also in Caius.

Cap. 40 lacks about ten lines containing the amusing explanation of how the four species of lepra got their names (p. 9).

Cap. 79, advising the use of a cord made from sheep's intestine, to be tied about the neck, with prayer, before instituting medical treatment for wounds, is missing, as in Caius. This paragraph (quite un-Salernitan in its superstitiousness) appears to be an interpolation which found its way into Bamberg I and II.

Cap. 82, introducing the passage on phlebotomy, is missing.

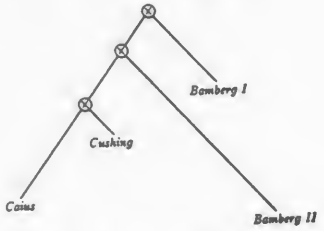
Cap. 87 follows 88, a more logical arrangement.

Cap. 102, describing the difference between nodus and rana under the tongue, and citing treatment, is missing, as in Bamberg II and Caius.

Cap. 113 is missing.

All of the manuscripts of the Bamberg Surgery are so much alike that little can be made out as to their possible relationship and order of preparation. From the handwriting, we know that Bamberg I is the oldest. In detailed wording, while the Cushing copy is much like Bamberg I, there are passages in which it is more like Bamberg II.

As far as can be made out from the uncertain evidence afforded by small differences, the relation of the four manuscripts may be somewhat as indicated by the following diagram.



The significance of the Bamberg Surgery, and its place in the development of surgical ideas, can only be understood in the light of the circumstances concerning its composition. When the writers of Salerno began to reconstitute their art in writing, they had access to little or nothing of the surgical treasures of the past except what was given them at the end of the eleventh century by the great translator Constantine. In the Graeco-Roman world the writing of surgery seems, practically speaking, to have ceased after the fall of Alexandria in 643 A. D., an event which is said to have been witnessed by the last great surgical writer of the Graeco-Roman tradition, Paul of Aegina. The books of Galen, Paul and the other surgeons of classical and post-classical times were preserved in the Mohammedan and Persian lands, where they were used as source material for the great Arabic encyclopedias of medicine prepared in the tenth and early eleventh centuries by Rhazes, Ali Abbas and Avicenna and the special surgical work of Albucasis (end of the tenth century). The Christian practitioners of southern Italy, however, had lost acquaintance with classical Greek and seemed to have carried on their art by verbal tradition and the transmission of practical experience from generation to generation. The proximity also of the Saracen practitioners of adjacent Mediterranean lands, learned in written lore, may well have helped to keep alive some remnants of the ancient art through direct contact and travellers' tales. Latin textbooks, however, were nonexistent. Sudhoff (1918) has given us a list of the surgical writings in Latin known to have been in use in Europe in the ninth and tenth

centuries. They amount only to a few excerpts from Galen's commentaries on the Aphorisms of Hippocrates, a trifling list of surgical names and definitions under the name of Heliodorus (edited by Sigerist, 1920), an abbreviation of Alexander Trallianus, Book III, on diseases of the ear, a few relics of surgical and gynecological therapeutics from Pliny and Soranus. The Megategni of Galen apparently did not become available in Latin until the time of Constantine. The medical diagnosis and therapy, the anatomy and the humoral physiology of the classical period were likewise represented in Latin in the Dark Ages by fragmentary and degraded relics, from some of which, as we shall see, our Salernitan compiler of the Bamberg Surgery levied contributions.

During the decades immediately following the taking of southern Italy by the Normans, the great translator Constantine gave his colleagues a vast treasure of medical learning by means of his translations from the Arabic. Of chief importance to the surgeons among the Constantinian writings is the Pantegni, a translation of the book al-Maleki, "The Royal Book," of Ali Abbas, a Persian said to have been court physician at Bagdad, who died in 994 A. D. The book is a complete system of medical theory and practice, summarizing the whole of classical medicine as understood by the Moslems. It is divided into two parts, *Theorica* and *Practica*, each of ten books. The ninth book of the Pars practica is specially devoted to surgery, and there are other passages of surgical importance elsewhere in the work. The Pantegni became, immediately after its translation, the chief source of all the Salernitan medicine; its part in the reconstruction of anatomy has been discussed (Corner, 1927). Another one of the Constantinian translations to which we shall have to refer is the little Viaticum, a traveller's pocketbook of general medicine, from the Arabic of al-Djazzar.

The Bamberg Surgery is not a systematic textbook, but rather a collection in more or less orderly sequence of excerpts and passages on surgical topics, some of which seem to have been composed especially, while others were taken bodily from the works of Constantine and other writers. The text is interspersed with numerous prescriptions, some of them entirely appropriate to the place in which they

are found (many indeed taken over from the Pantegni), but others interpolated in such an irrelevant way as to suggest that the book grew in much the same fashion as a book of recipes or commonplace book. Sudhoff pointed out, when he first published the text, that part of the work was copied directly from the ninth book of the Pantegni, Pars Practica, and that another part is a copy of a little book on blood letting, the so-called Flebotomia Ypocratis. We shall see that besides the passages recognized by Sudhoff, there are a number of others which can be traced to the Constantinian translations and to other works known to have been in use in Europe in the pre-Constantinian period. The Bamberg Surgery, therefore, belongs to the group of Salernitan writings composed in the period immediately following Constantine, when medicine was being reconstituted under the influence of the great translator, but before the teachers and practitioners had completely broken away from the literature and traditions of the Dark Ages. Another example of the literature of the same period is the Anatomy of the Pig, attributed to Copho, discussed by Corner (1927).

An analysis of the Bamberg Surgery shows that it is constituted in the following way:

Capita 1 to 13, a treatise on wounds and fractures of the skull and wounds of the rest of the body;
14 and 15, foreign bodies in the ear;
16 to 28, prescriptions for various lesions and infections;
29 to 39, major surgical infections, tumors and malignant diseases;
40 to 45, 61 and 62, medical treatment of skin diseases;
46 to 48, miscellaneous surgical lesions;
49 to 60, diseases of the head, neck and eyes;
63 to 77, fractures and dislocations;
78, tetanus;
79, an interpolated formula;
80 to 87, 89 to 92, blood letting;
88, a prescription for hemorrhoids;
93, the soporific sponge;
94, the four humors and their relation to surgical pathology, surgical treatment of leprosy;

96 to 100, 106 to 108, and 110, cauterization for various diseases;
101 to 103, sublingual tumors, disease of the uvula;
104, hemorrhoids;
105, ascites;
109, sciatica;
111 and 112, hernia;
113, cupping.

The work begins with an etymological explanation of the word surgery, followed by a brief and somewhat confused discussion of the nature and functions of the brain and its membranes and of the pathological effects of fracture of the skull and infection of the meninges. Diagnosis of fracture of the skull is briefly mentioned. This part of the book (Capita 1-5) is a poor remnant of Greek surgical tradition. The only original statement is, however, important. It is a caution against the use of oily applications to wounds and fractures of the skull on the ground that such treatment tends to cause putrefaction of the membranes. Considering the strong possibility that oils and ointments made in medieval times would be infected with pyogenic micro-organisms, the advice is certainly sound, although it is contrary to the general rule of Greek and Arabic surgery, in which the use of oils was freely prescribed for head wounds.

Next comes a section (Capita 7-8) on spear and arrow wounds, and on the removal of such weapons from the body. As noted by Sudhoff, it is almost entirely copied verbally from the Pantegni, Pars Practica IX, 20.

Cap. 9 deals with perforation of the viscera by weapons. Except for a few connecting sentences and a prescription, it is theoretical-anatomical and is copied from the so-called Second Epitome of Vindician (Rose, 1904, capita 17 and 27). The name of Vindician, a Byzantine court physician about the year 370, is attached to a number of fragments dealing with anatomy and medical theory, which seem to have been popular during the Dark Ages, and which survived in a number of manuscripts of the ninth, tenth and eleventh centuries, one of which our Salernitan compiler evidently had at hand. After the spread of the new learning based on the translations of Con-

stantine and the later translators of Toledo, the Vindician texts were practically forgotten.

In Cap. 10 there is something new, namely, a brief mention of a method of suturing the intestine over a cannula (see p. 16). This method seems not to have been known to the surgeons of antiquity. The latter part of the paragraph, dealing with poisoned arrows, is copied from the Pantegni, Practica IX, 20.

The next few paragraphs, dealing with injuries of the nerves, consist entirely of prescriptions.

Capita 14 and 15, discussing worms and foreign bodies in the ears, are copied, with slight rewording, from the old Latin translation of the Euporistes of Oreibasius, as transcribed by Molinier in Bussemaker and Daremberg, Tome 6, p. 558.

The long section which comes next, Capita 16 to 28, dealing with muscle wounds, erysipelas, purulent wounds, etc., is simply a series of titles or definitions of the lesions to be treated, followed by prescriptions.

Cap. 29 is concerned with wound infections and with the general relationship of various kinds of phlegmonous conditions to the four humors, and their diagnostic discrimination. The paragraph contains two passages copied literally from the Isagoge of Joannitius (Hunain ibn Ischaq), a little introduction to medicine composed in the ninth century and popular with the physicians of Europe and the Near East for several centuries thereafter. These are the theoretical remarks "horum quidam . . . cancri interiores," "Flegmon ex sanguine . . . absque sensu."

Cap. 30, dealing with excision of glands and nodes, comes almost literally from the Pantegni, Practica IX, 15. The first sentence of Cap. 31, which discusses scrofula from the medical standpoint, is practically identical with a similar sentence in the Viaticum VII, 33, de Scrofulis. It may be said at this point that detailed comparison of the words of the Bamberg Surgery with such books as the Viaticum would perhaps reveal other instances in which introductory sentences or brief definitions of disease serving as paragraph headings were taken over directly into the surgical work. The inclusion of such short passages does not necessarily mean, however, that they

were copied directly from books, for Salernitan literature is full of such clichés, which may well have been part of the memorized vocabulary of speakers and writers.

Cap. 32, defining goiter and giving a prescription, is not Constantinian, but the next paragraph (33), describing the operation for goiter, is copied from the Pantegni, Practica IX, 16.

Capita 34 to 39, giving definitions and prescriptions for surgical lesions, are not from Constantine. The discussion of lepra in Cap. 40 is indeed quite unlike that of the Pantegni. It runs as follows (translated from Sudhoff, 1918, p. 124):

"Distemper of the humors causes lepra, of which there are four kinds, namely, leonina, elephantia, tiria, allopicia. Allopicia comes from phlegm and is compared to the wolf because those who suffer from this kind of lepra become depilated like wolves. Tiria comes from black bile and is compared to *tirus*[1] because just as a *tirus*, when he itches, scratches himself between his spines until he loses his prey, so those who suffer from such a humor scratch at themselves all day long. Leonina comes from red bile and is named from the lion because just as the lion is hotter than all other beasts, so is this disease hotter than others; or perhaps because the lion is varicolored, and so do these patients vary in their colors. Elephantia comes from blood and is named from the elephant because blood is the most plentiful of all the humors just as the elephant is the largest among animals."

A similar passage occurs in an early Salernitan medical work, the Practica ascribed to Archimattheus. The Pantegni gives only two kinds of lepra; the division into four species occurs in the Viaticum, but not the animal comparisons. The rest of the section on skin diseases, capita 41 to 45, consists of definitions and prescriptions, some of which do not especially resemble the longer discussions given in the Pantegni, except the passage about morphea (a skin disease of uncertain nature), which follows the Constantinian passage on the same subject.

Beginning with Cap. 46, there is a long section extending through Cap. 59, covering diseases of the throat, head and eyes, with small digressions about extra digits on the hand and gynecomastia. This is all taken part and parcel, as mentioned by Sudhoff, from the Pantegni, Practica IX, 21-33, 41, 43, 44.

[1] Tirus, A generic term for any monstrous wild animal, also used specifically for the hippopotomus, rhinocerus, crocodile, etc.

Cap. 60 gives the method of removing a fish bone from the throat by having the patient swallow a sponge tied to a string. This is not in the Pantegni, but is cited by Paul of Aegina and by Albucasis, and is just the sort of emergency treatment that might well be perpetuated by hearsay.

Capita 61 and 62, dealing with warts and a special kind of pustules of the skin called *formicae*, are worked over from the Pantegni, Practica IX, 18.

Our compiler of the Bamberg Surgery now comes to the subject of fractures and dislocations. Desiring to begin this part of his work with an account of the human skeleton, he takes practically the whole of Cap. 63 from the Second Epitome of Vindician, Cap. 33. The passage is one which was copied in several manuscripts of the Middle Ages, as indicated in the bibliography appended to the present paper. The reader who will compare its literary style with the passages in Capita 46 to 57, for example, will see at once the contrast between the Constantinian Latin of the latter section and the curiously naive verbiage of the Vindician text, interlarded with unfamiliar-looking technical terms of Greek origin degraded by centuries of ignorant copying. Even the numbers of the bones became confused in the transmission of this text, some of the surviving manuscripts giving one total count, some giving another.

Capita 64 and 65, dealing with fractures in general, give a very brief account of the subject not taken from the Pantegni, but representing in a simple and condensed way the general Graeco-Arabic lore of fractures and other treatment.

In Cap. 66 there is an account of the relation between the rate of consolidation of fractures and the age of the patient. It is introduced by a statement of the seven ages of man, which gives the impression of having been derived from some earlier book, not as yet identified. Later in the paragraph, the Megategni of Galen is quoted twice.

Capita 67 to 77 deal with dislocations, giving a brief account of their reduction by the usual Hippocratic methods as they had come down through the ages. The passage is not copied from any known surgical work and probably represents the oral tradition of surgeons

whose predecessors centuries before had been familiar in detail with Greek practice in this branch of surgery. If this discussion represents all that was known in early Salerno of the diagnosis and treatment of dislocations, it must be admitted that the Hippocratic tradition had nearly run its course before such translators as Constantine revived it with their textbooks from the Arabic.

Cap. 78 discusses spasm supervening upon a wound, which is said to occur in three species, emprostonos, opisthotonos, and tetanus. The passage, like that about the skeleton, contains degraded Greek terms with explanations in Latin, and gives every impression of having been copied from some document or other of the general type of the Vindician fragments; but as yet a text from which this passage could have been actually copied has not been found. The three kinds of spasms following wounds are classified in the same way in Oreibasius and Paul of Aegina, but not in the Pantegni.

This paragraph contains also two quotations from the Aphorisms of Hippocrates. These are cited in the words of the so-called "ancient translation" which according to tradition was made by Constantine and which can be found in printed form in various editions of the Articella.

Cap. 79 has already been referred to as a probable interpolation. It is a magical formula quite out of keeping with the rest of the work.

From Cap. 80 to 86, inclusive, we have a treatise on phlebotomy which, as Sudhoff showed, is practically a complete copy of the so-called Flebotomia Ypocratis. This little early medieval book has come down to us in various manuscripts (Diels, 1905, p. 52). Two of the texts have been printed in a dissertation by Morgenstern, 1917, and a similar text found in a manuscript of St. John's College, Oxford, written in the earliest twelfth century, has been printed by Singer, 1917. This work is known to have existed, in something like the form seen here in the Bamberg Surgery, from a time at least as early as the tenth century, possibly even of the ninth, for there are manuscripts attributed to those centuries in Glasgow and Brussels. As pointed out by Singer, it is itself a compilation containing passages from the still more ancient booklet on blood letting attributed to the Venerable Bede. No doubt the compiler of the Bam-

berg Surgery added it to his working manual of recipes and practical lore, because of the solid reputation which it had acquired through centuries of use.

Cap. 88, a brief recipe for the treatment of hemorrhoids, occurs in all four manuscripts of the Bamberg Surgery, but it does not fit the location and is probably an early interpolation.

Capita 89 to 92 deal again with the subject of phlebotomy, but they do not come from the Flebotomia Ypocratis, and obviously represent a fragment of some other text on that subject which was thought worthy of inclusion. An indication of their source is seen in the word-for-word similarity of Capita 89-91 to a passage (lines 90-95) of the " Epistola de Fleutomia " printed by Czarnecki (1919) from a ninth or tenth century manuscript of San Lorenzo in Florence. Cap. 92 also is something like the next sentences of the same work, and it is clear that the compiler of our surgical book was copying from such a pre-Salernitan text. At some time, however, in the transmission of the passage, one of the copyists was so ignorant as to convert into adjectives two nouns in the ablative, *spleneticis* and *pleureticis* (meaning persons suffering respectively with splenic disease and with pleurisy), so that the text now refers to a splenetic and a pleuretic vein, blood vessels never known to anatomists even in the Dark Ages.

Cap. 93 gives the formula of the famous " soporific sponge." It consists of a mixture of opium with the juices of hyoscyamus, poppy, mandragora leaves, ivy, mulberry and hemlock, and lettuce seeds. The sponge is steeped in the mixture and allowed to dry (our author directs this to be done in the dog days). For use, the medicated sponge is soaked in warm water and is applied to the patient's nostrils. Sigerist (1923) found the same formula in the Reichenau Antidotarium of the ninth or tenth century, and Sudhoff (1921) discovered it in a ninth century manuscript of Monte Cassino. The Cushing manuscript has on the margin of leaf 38 verso, an entry in a thirteenth century hand, giving a simplified recipe of the same sort with the names of the ingredients written in a secret cipher (see below, p. 23; pl. 4, 5).

Cap. 94 mentions the four humors and describes in a confused

way certain diseases arising from disturbances of the humors. It then goes on to describe the operation of trephining for epilepsy. The passage about the humors gives the impression of being a badly garbled condensation of one or another of the texts dealing with the humoral pathology which were extant in pre-Salernitan times. It has not been possible, however, to detect the exact source of this excerpt.

The next section of the book, Capita 95 to 100, discusses application of the cautery for diseases of the eyes and nose. Capita 106 to 108, and 110, dealing with cauterization for pain in the extremities, seem to belong to the same group, the whole of which forms a treatise on cauterization in general. Such texts in Latin dating from the eleventh century and probably earlier, were current in Salernitan times (Sudhoff, 1914), but the wording of this part of the Bamberg Surgery is not exactly like any of the known examples. Cap. 101, giving the operative treatment of sublingual tumor, is like the corresponding place in the Practica in its significance, though not in the wording; the operative procedure is the same. Cap. 102, classifying sublingual tumors and describing the manual rupture of sublingual abscesses, is not directly from Constantine. Cap. 103 deals with enlargement of the uvula and cites an operation like that of the Pantegni, but gives also a method of treatment by the application of styptics placed in a metal spoon and applied to the uvula from below. This method is found in Paul of Aegina, but not in the Pantegni, and must have been transmitted by oral tradition. Cap. 104 gives the definition and medical treatment of hemorrhoids. It begins with an etymological explanation of the name, after the style of the early medieval vocabularies ("ema enim grece, latine sanguis dicitur; rois fluxus, inde emoroides id est sanguis fluxus"). An aphorism of Hippocrates (VI, 12) is cited. The passage is not from the Pantegni. In the Practica of Archimattheus, already mentioned as showing in another place a resemblance to the Bamberg Surgery, there is also a passage giving the same etymology of the word hemorrhoid and citing the same aphorism.

Cap. 105 discusses ascites and is almost literally taken from the Pantegni, Practica IX, 46. The Bamberg Surgery adds a brief case report about a man who died from too hasty removal of abdominal

fluid; but this danger was known to Galen and the story may be traditional.

The passage on sciatica, Cap. 109, has the explanatory character which in the Bamberg Surgery generally hints at copying from an earlier text. It has not, however, been traced to a definite source.

Capita 111 and 112 deal with hernia, giving the standard treatment by knife and cautery which had come down through all the Greek and Arabic treatises. These chapters are written quite differently in Bamberg I and Bamberg II; the Cushing manuscript contains the older version. In both, the wording is entirely different from that of the Pantegni, but in a general way, the procedures agree with those transmitted by Constantine in the Pantegni and the Viaticum.

Cap. 113, the final passage of Bamberg I, on cupping, which is not present in the other three manuscripts, is taken almost entirely and quite literally from the Pantegni, Practica IX, 11.

The prescriptions which form so large a part of the Bamberg Surgery would provide material for an elaborate study. In general, they represent the same elements as the diagnostic and operative parts of the text. Some of the compound drugs bear ancient names, well known in classical surgery, as for example "marciaton." The names of others suggest their invention in the days of monkish medicine, for example "apostolicon," the very name of which confers a benediction. (In reality it was much like fly-paper; see prescription, p. 18.) These old prescriptions occur repeatedly in the ninth and tenth century formularies (Sigerist, 1923). Others, no doubt, were concocted or modified to suit contemporary taste. The surgeons did not fear lengthy prescriptions. The formula for marciaton, given in Cap. 11, contains, for example, about fifty ingredients. Nor did they dread a slight admixture of animal products not to twentieth century taste. In Cap. 13 we find earthworms in oil; bear's grease and the milk of a sow with her first litter enter into other prescriptions. The pharmacopeia, however, did not approach that of later centuries in complexity or whimsicality, and on the whole, it must be admitted that the practitioners of Salerno were relatively sensible in their use of drugs.

The foregoing analysis is sufficient to show how the compiler of

the Bamberg Surgery made up the text which he bequeathed to us. We can see him at work, not as the author of a continuously written, formally organized monograph, but rather accumulating in his notebooks from time to time such passages, fragments and notations as seemed to him worth preserving for future use. We have spoken of a single author; it is more likely that there were many compilers whose marginal comments and additions were absorbed into the text, which may well have taken several decades to grow to the state in which we find it in the earliest existing manuscript. The text must, however, have ceased growing well before the end of the twelfth century, for the compilation in 1170 and rapid spread of the much more complete and better organized Surgery of Roger would have rendered it obsolete. The ingredients which went to make up the Bamberg Surgery were, first of all, long passages and many isolated fragments of the Latin Pantegni (at the time perhaps a half century old) and excerpts from books of older provenience, namely, the Second Epitome of Vindician, the Flebotomia Ypocratis, another work on phlebotomy resembling the so-called Liber de Fleutomia, the Euporistes of Oreibasius, the Isogoge of Joannitius, and in all probability, the Viaticum and one or two unidentified treatises dealing with humoral pathology and the ages of man.

In general, therefore, the surgical information conveyed by the Bamberg Surgery came to Salerno by three pathways. The major part of it came indirectly from Graeco-Roman sources through the Arabic civilization and the translations of Constantine. Another element, chiefly theoretical and explanatory, was inherited directly from Greece and Rome through Byzantium in Latin books like those of Vindician and Oreibasius. A third element was that conveyed by the handing down of experience from generation to generation, by oral tradition, and probably to some extent by direct contact with the better trained physicians of the Arabic lands. At first glance seemingly an important feature of Salernitan surgery, this element of local tradition appears less and less extensive as one analyzes the written texts, and the investigator of Salernitan medicine comes ultimately to realize that in the field of surgery, as in others, before the days of Constantine the art must have ebbed as low in Salerno as elsewhere in Europe.

The compilers of the Bamberg Surgery, however, may lay claim to originality with regard to a few special methods of treatment, at least until proof is brought forward of earlier sources. We have mentioned already the method of suturing the intestine over a cannula. The passage, which is all too brief, reads as follows (translated from Sudhoff, 1918, p. 114):

"but if the intestines are ruptured, let them be sutured; and place a very delicate tube inside, as we have said."

This passage, taken alone, leaves it obscure whether the cannula was used as a support for the intestine during the suturing or was inserted as a means of keeping the lumen open. In the Surgery of Roger, however, a similar operation is given in greater detail, as follows:

"A cannula is made of elder wood in the shape of the wound of the intestine, but one inch longer than the wound at each end. The cannula is made, then it is inserted through the wound of the intestine and the wound is sewed with a sharp needle and a silk thread. The cannula is placed there in order that the contents of the intestine may pass through it and that the suture of the wound may not make an obstruction." (Translation of Sudhoff's text of Roger, 1918, p. 217.)

The application of the trephine for epilepsy apparently represents the first time in surgical literature that such an operation is specifically recommended for that particular disturbance. It is well known, of course, that trephining was used even in prehistoric times for the release of noxious humors or evil spirits from the cranium.

The description of an apparatus for hernia, given in Cap. 112, comes a little closer to the modern truss than any previous description. The Viaticum (Cap. VI, 8) mentions a lead plate to be bound over the rupture; the Bamberg Surgery gives directions for constructing a definite appliance. The passage reads as follows (translated from Sudhoff, 1918, p. 146):

"If the patient does not wish to undergo the treatment by extraction of the member (i.e., testis) and by cautery as we have described above, we may indicate how (the hernia) may be reduced. A mould is made in clay in the shape of a shield, having the hole in the middle. We then pour melted lead into it so that it takes the form of the mould; when it has cooled, take it from the mould and place it on the ground; then it is gently pounded with a blunted hammer and worked with shears as much as necessary. It is then sewed

between two bands as if in a bag. When it is ready, we put the aforesaid plaster, namely apostolicon, upon the skin and we apply the shield-shaped object so that one of the bands hangs downward and passes between the buttocks. Their ends are tied over the kidneys. When he goes to sleep it is removed and is reapplied in the morning."

The "soporific sponge," which has already been mentioned, appears in the Bamberg manuscripts for the first time in a text book of surgery, its previous appearances having been in manuals of pharmacy.

Perhaps the most astonishing novelty of all is the use of ashes of seaweed and sea sponge, which we know now to contain iodine, for the treatment of goiter. The passage runs as follows (translated from Sudhoff, 1918, p. 121):

"A collection occurs in the throat which is called bozum[2] which we are well able to cure: ℞ Asparagus, bruscus (*Ruscus aculeatus*), cyclamen, polypodium, viticella root, cucumber, wild cucumber, aristolochia rotunda, yarrow root, seaweed, marine sponge, branca ursina, saponaria, the milk of a sow nursing her first litter, and roots of thapsia. Prepare as follows: Dry all the ingredients in the sun or in the oven, then grind and sift them, then burn the seaweed and the sponge and mix it with the foregoing to make an electuary. When the patient retires, put it under his tongue."

It has been stated that this use of the sponge was previously known to the Chinese, but it does not appear in Greek medicine, nor did it find its way into the Pantegni.[3] It must have been invented in southern Europe or, if actually known in the distant Orient, came overland to Europe by the caravan routes some time before the twelfth century. Possibly it represents only a fortunate coincidence. Medieval therapy made use of an immense variety of substances, most of which obtained their place in the pharmacopeia on purely empirical grounds or because of some assumed relationship, no longer tenable. We must not take it for granted, simply because modern knowledge shows a drug to be rational, that its original introduction was achieved

[2] I. e. botium.

[3] It is frequently stated in articles on the history of iodine therapy, that Galen, Hippocrates, and Pliny cite the use of sponge or seaweed for goiter; but actually as far as can be ascertained, all the references to such drugs in classical literature have to do with other conditions. For the evidence from China see Morse, 1934, who cites the "Pen Ts'ao Kang Mu" of Li Hsi Chin, a compilation from old works, itself however not published until about 1596 A. D.

by an act of reason. The ashes of sponge had been already in use for centuries as a styptic. It was well known in Salerno that goiter was more prevalent in the Alps than near the sea; some genius among the profession may well have undertaken to exhibit to the patient, if only for symbolic reasons (in accordance with the doctrine of signatures), a medicine typical of the sea.

Having thus analyzed the Bamberg Surgery and traced its history as far as possible, it may be instructive to look at it again from a general standpoint, and to ask what manner of surgical practice was carried out by those who used such a textbook. As to that, let the compilers speak for themselves. Herewith are translated a few selected passages from the book, illustrating the treatment of various lesions, and, as far as possible, representing the various surgical traditions which enter into it. In making these translations, the writer has availed himself of both the Bamberg texts and the Cushing manuscript, frankly choosing the most intelligible reading from any one of them. The page numbers in parenthesis refer to the Latin text published by Sudhoff (1918).

Cap. 2. Compound fracture of the skull (p. 109).

"From the day on which the fracture occurs until the 5th or 7th day, or until the cranium consolidates and the whole wound becomes covered with flesh, you should insert a silk cloth into the fracture twice a day, over which we advise the placing of a linen cloth. When a fracture occurs it is accompanied by various wounds and contusions. If the contusion of the flesh is small but that of the bone great, the flesh should be divided by a cruciate incision down to the bone and everywhere elevated from the bone. Then a piece of light, old cloth is inserted for a day, and if there are fragments of the bone present, they are thoroughly removed. If the bone is unbroken on one side, it is left in place, and if necessary elevated with a flat sound (*spatumile*) and the bone is perforated by chipping with the *spatumile* so that clotted blood may be soaked up with a wad of wool and feathers. When it has consolidated, we apply lint and then, if it is necessary (but not until after the whole wound has become level with the skin), the patient may be bathed. After he leaves the bath, we apply a thin refrigerative plaster made of wormwood with rosewater and egg. Make it thus: mix the wormwood with the white of egg and the rosewater, and beat thoroughly. On the following day apostolicon should be applied so that if any water has appeared in the wound or entered it, it may be removed and the wound restored to condition. To make (apostolicon) take pure wax, 6 ounces; mastic and olibanum, of

each 2 ounces; galbanum, ammoniac, of each 3 ounces; naval pitch, 1 pound; colophonium, 1 ounce; turpentine, 2 ounces. To prepare this, put all the ingredients in an earthenware vase and finally melt the wax on a slow fire and strain through a cloth which is suspended over cold water. Gather it into one mass; then it is extracted near the fire and troches are made and when necessary are applied to the skin or inserted into the wound, above which we apply the waxy residue, which is thick and dry, in order that the pus may not run down. Above this another dressing is placed in order that the inner dressing may not become soaked with pus, because just as a sea sponge takes up water, so a linen cloth takes up pus, and thus the inner dressing is prevented from becoming laden with pus."

Cap. 13. Lesions of peripheral nerve (p. 115).

"It is to be noted that if a nerve is cut lengthwise, it is possible to heal it by the following treatment. Steep earthworms in oil and place the oil, warmed over the fire, upon the wound three or four times with no other medication. If it is cut obliquely, it will not heal with the foregoing treatment, and if it is completely cut obliquely, it will scarcely consolidate at all."

Cap. 30. Excision of nodes and glands (p. 120) (Pantegni, Practica IX, 15).

"The skin is cut lengthwise and not only the node, but its whole sac, is excised and radically extirpated. If anything remains, it will be the cause of another node. You may soften hard nodes with mollificative or maturative applications and drain the pus. If anything then remains we use corrosives."

Cap. 33. Operation for goiter (p. 122) (Pantegni, Practica IX, 16).

"For goiter in which such medication is of no avail (referring to the prescription in the previous paragraph containing ashes of sponge and seaweed; see p. 17), surgery is necesssary. The skin is cut lengthwise and (the tumor) is withdrawn with all the material adherent to it. If you wish to be certain of this, you may cauterize with a large iron the whole interior of the cavity from which you have extracted the goiter. Care should be taken that the pulse or nerves are not injured in surgery of this kind. If, however, such an accident occurs, you should suture or ligate at each side of the wound. After ligation, it is seared with the cautery and whatever forms in the wound (hematoma?) is broken. If you do not wish to cauterize when the tumor is removed, search diligently to make sure that nothing remains, for if anything remains, it will form again as before. When the region has been completely cleaned out, it is partly sutured and red powder is applied. A cloth is placed in the wound and the treatment proceeds as stated above, but without a poultice."

Cap. 50. Catarrh descending into the eyes (post-herpetic neuralgia?) (p. 127) (Pantegni, Practica IX, 22).

"Catarrh descending into the eyes causes a sensation as if ants were crawling through the forehead and temples. The patient's face becomes strongly reddened. In this disease, therefore, the temples and forehead are shaved, the muscles of the temples are located by moving the lower jaws, and the skin is incised down to the bone by even, straight cuts in three places, avoiding the muscle. These incisions of the veins are made at a distance of 2 inches from each other. When this has been done, an iron instrument is pushed from one incision to the other between the skin and the bone, and turning the edge of the knife toward the skin when the arteries and veins are found, the skin is cut and from the edges of the incision the blood is permitted to run abundantly, and when no more remains the vein is compressed. When the place has been perfectly purged, it is packed with a linen cloth and treated like other wounds."

Cap. 54. Symblepharon (p. 128) (Pantegni, Practica IX, 27).

"If the cornea or conjunctiva become joined to the eyelid, the latter is elevated by an iron instrument inserted between the lid and the eye, avoiding the membranes of the eye. Cut the fleshy adhesion. When this has been done you should masticate salt and cumin [4] together in your mouth and expectorate it into the eye. We then bind upon the eyelid a wad of wool soaked in white of egg and reapply it twice a day until the third day. After the third day, it is washed with old rosewater and other things, namely juice of verbena and wormwood."

Cap. 69. Reduction of dislocation at the shoulder joint (p. 133).

"We take a ball of twine or anything round and place it under the armpit, having someone retain it with a bandage. The patient lies supine. The doctor, bending over him, makes traction upon the arm, meanwhile pressing upon the ball with his heel until the bone is elevated. When the bone returns to its proper place, we immediately bind it, leaving the ball in place and holding it with the finger. We ought to keep it in such a ligature until the third day. On the fourth day the bandage is gently removed and (the shoulder) lightly anointed with marciaton or dialthea. After the tenth day we ought to abduct the forearm from the side gently until it is cured. After it is entirely cured, he may go to the bath, and we then direct apostolicon to be applied to the skin."

Cap. 98. Nasal polyp (p. 141).

[4] "Rank-smelling rue, cummin good for eyes."
Spenser, Muipotmos or the Fate of the Butterflie.

"Sometimes a humor descends from the head to the nose and causes polyp, for which we administer the following treatment. We apply to the nose for one hour firm wicks of linen treated with the foregoing ointment, made from quicklime, spatarene soap, and capitellum (a corrosive compound). When this has been done, it is treated as if it had been cauterized by fire, but if it does not yield to the above ointment, it is cut with a very thin knife and we then burn it with hot irons as much as necessary, and in order that the flow of the evil humor may be drained by the veins we treat the veins in the temples with yolk of egg and other things, as we have described; but if the polyp is livid or black, you may know that it is caused by black bile, and may rarely or never be cured."

Cap. 112. Hernia (p. 146).

"If the intestines descend (into the scrotum) we operate surgically as follows. The patient is placed with his feet elevated and the scrotum is cut from below so that the testicle itself appears. It is grasped in two fingers and by lifting it by the finger nails or tearing it away from the intestine itself, it is drawn toward the pubic bone and extracted. It is then sutured above with a large needle and firmly ligated with thread so that the ends of the ligature hang together from the wound. After this, the testicle is cut away from the intestine with hot irons, a little below the ligature in order not to loosen it. The patient is then led to his bed and all the treatment described above is administered. When the putrid and burned flesh comes away, that is to say, about the 7th or 9th day, we remove the cord from the place." (Then follows the description of a restraining apparatus or truss; see p. 16.)

From the foregoing examples it is evident that the twelfth century patient could have had no reason to complain of the enterprise or the courage of his surgeons. As to their knowledge and intelligence, we may grant them at least the respect due to men who did not live altogether upon the past, but were able to take up and use the innovations brought in by Constantine. Upon their work, such as it was, the surgery of modern Europe was founded.

Description of the Cushing Manuscript

The Cushing manuscript is a book bound in sheep skin-coated wooden covers measuring 135 by 203 millimeters. The ancient and greatly worn external binding bears an almost obliterated geometrical design in ink, and some words in a very old handwriting, of which all that can now be deciphered are *Lib. Medicinal.*, and in another hand, almost obliterated, *chirurgia.* Broken remnants of old clasps

are present on the front cover. The book comprises 41 vellum leaves, of which the first 25 contain an early text of the Surgery of Roger, with many marginal comments in handwritings of various centuries from the thirteenth on. The writer hopes to publish at some later time an analysis of this Roger text. Leaves 26 to 41, inclusive, contain the text of the Bamberg Surgery, written in a small, clear, accurate hand of the late twelfth century. The text begins without title or *incipit*, but with a table of contents in two columns, occupying the first side and part of the second side of leaf 26 (Plates 1, 2). The text proper begins thereafter with a pretty illuminated initial in red, blue and yellow, followed by one half column of writing on leaf 26 verso, after which, beginning with leaf 27, the text proceeds in one column (i.e. full page width), 33 lines to a page (Plate 3). Each paragraph begins with a plain initial, alternately red and blue; and on the first six leaves there are rubrics at the head of each paragraph.

It appears that the scribe never finished his task of copying this work, for the manuscript terminates, without an *explicit*, near the top of leaf 41, omitting the final paragraph of Bamberg I, but leaving sufficient ruled space to contain that paragraph had it been written. Furthermore, the rubrics cease about one-third way through the book at the top of leaf 31, although space has been carefully provided at the head of all subsequent paragraphs for rubrics which were never entered. There are on almost every page several corrections in the form of interlinear insertions, or supplying the place of omitted and erased words or letters of the original. These entries (which are made with very black ink in a very small but clear hand, little if any later than that of the original scribe) sometimes correct errors, sometimes insert omitted words, and sometimes add explanations. For example, in a number of places the Latin meaning of a Greek term is given in the corrector's hand. Another person numbered in black ink the individual items of the original table of contents on leaf 26, and thereafter attempted to insert corresponding numbers in the text, on the margin opposite each paragraph. In this task he evidently became confused, partly perhaps because the table of contents does not accurately match the rubrics, and he seems to have given up the effort before he reached the end of his task. No numbers appear

after leaf 39 recto. Not only as a result of this bungling work, but also because the various manuscripts do not divide their paragraphs in exactly the same way, the numbers written upon the Cushing manuscript do not agree with those assigned by Sudhoff (1918) to the paragraphs of his transcription of Bamberg I.

On several pages of the manuscript there are marginal entries in various handwritings of the thirteenth, fourteenth and fifteenth centuries. Some of them are merely names of prescriptions given in the text, others are complete recipes and formulas. A complete transcription of all the marginalia has been made and will be filed with the manuscript. Only those which are of special interest are cited here.

Two of the marginal prescriptions of this manuscript, as well as another found on Fol. 25 of the Surgery of Master Roger which is bound in the same volume, contain words written in a cryptographic code. The three entries are all in the same handwriting (thirteenth century) and each of them deals with a topic in one way or another subject to concealment from the laity. The decipherment of the cryptogram has been described in a separate article (Corner, 1936).

Herewith are transcribed and translated those two of the three which are found in the Bamberg Surgery.

Fol. 38 verso at bottom (see Plate 4, A) (The words in capitals are written in cipher in the original).

"Ad infirmum ut sompnus cito provocetur ut totum possis incidere et non senciat. ℞ corticem MANDRAGORI, IUSQUIAMI, LEUISTICI seminis ana ʒ iij. Pista in mortario, distempera cum ydor frigida et per tres dies dimitte stare in umbra, et quando vis incidere hominem aut coquere, infunde frontem ab aure ad aurem et pannum lineum superpone et unge nares fortiter. Cum volueris excitare, infunde pannum lineum in oxi et naribus applica et evigilabit."

"For a patient, to induce sleep quickly so that you may cut him and he will not feel it. ℞ bark of mandragora, hyoscyamus, levisticum seed, of each ʒ iij. Grind in a mortar, dilute with cold water, and leave it to stand in the shade for 3 days. When you wish to cut or cauterize a man, wet his forehead from ear to ear (with the mixture), lay a linen cloth over it, and anoint his nostrils thoroughly. When you wish to wake him, soak a linen cloth in vinegar, apply it to his nostrils, and he will awake."

This prescription is a simpler version of the well known formula for the soporific sponge, discussed on page 17 above.

Fol. 41 verso (see Plate 5, A) (parentheses indicate letters lost by trimming; words in capitals are written in cipher in the original).

"(Gr)ecum Ignem inextinguibilem Sic Fac: ℞ sulfur vivum et tartarum, (sa)rcocollam et colofoniam, sal tostum, oleum petroleum et oleum commune. Hos simul fac (?sa)tis bullire et impone stupam vel lichinen, et incende; et si vis, extrahe per embotum. (Fla)mmam (?) per urinam et acetum extinguitur."

"Inextinguishable Greek fire. Make it thus: ℞ live sulphur and tartar, sarcocolla, colophonium, salt from heated brine, petroleum and olive oil. Boil these together. Place the mixture upon a pad or cloth and set fire to it. If you wish, draw it through a tube. The flame (?) may be extinguished by urine or vinegar."

The following prescription in another thirteenth century hand is rather typical of medieval dermatology.

Fol. 41 recto at bottom, in a thirteenth century hand (see Plate 4, B).

"Unguentum album ad flegma salsum. ℞ ceruse ℥ ij, litargiri ℥ ij, olibani ℥ iij, masticis ℥ iij. Unaqueque superiores per se pulverizetur. Pulvis ceruse cum oleo pauco distemperetur. Addatur litargirum, deinde mastix et olibanum cum pistello semper agitando, paulatim ponatur aqua rosacea et tamdiu ducatur quod nec multum spissum nec multum liquidum fiat."

"White ointment for salt phlegm.[5] ℞ white lead ℥ ij, litharge ℥ ij, frankincense ℥ ij, mastic ℥ ij. Each ingredient is pulverized separately. Make the powdered white lead into a paste with a little oil. Add the litharge, then the mastic and the frankincense, while continually stirring with a pestle. Rose water is added slowly and the mixture is stirred until it is neither too dry nor too liquid."

The next formula is for a surgical dusting powder.

[5] "A Somnour was ther with us in that place
That had a fyr-reed cherubinnes face,
For *sawcefleem* he was . . .
. . . . . .
There nas quik-silver, litarge, ne brimstoon
Borus, ceruce, ne oille of tartre noon,
Ne oynement that wolde clense and byte
That him mighte helpen of his whelkes whyte,
Nor of the knobbes sittinge on his cheekes."
Chaucer, Canterbury Tales.

Fol. 41 verso, in a fourteenth or fifteenth century hand, German or English (see Plate 5, B).

"Pulvis ad super ducandum coreum vulneribus: ℞ litargiri, mirre, olibani, antimonii, aloes, ana ℥ j, sarcocolle, ceruse, tatimie, argenti, colofonie, gallarum et aristologie utriusque combuste, farine fabarum ana ℥ s(emis), aluminis, radicis yris, mardasegni, camphore, ana ℈ i, sanguis draconis, boli, mumie, ana ℈ s(emis); pulverizentur subtilissime ad modum alcohol."

"Powder for inducing growth of skin over wounds: ℞ litharge, frankincense, antimony, aloes, of each ℥ i, sarcocolla, white lead, tatimia (?), (quick)silver, colophonium, galls, both kinds of birth wort (aristolochia) burned, and flour of beans, of each ℥ ss, alum, iris root, mardasegni (?) camphor, of each ℈ i, dragons' blood (sanguis draconis), bolus, mummy, of each ℈ ss. Let them be ground very fine like alcohol."

The word *alcohol* is used here of course in the original significance of the Arabic *al-kohl*, powdered antimony or galena (von Lippmann, 1913).

Finally, an incantation for veterinary purposes:

Fol. 41 verso, in another fourteenth or fifteenth century hand (see Plate 5, C).

"Contra farsum equorum quod vermis vulgariter dicitur qui rodit inter cutem et carnem: Accipe equum per dextrum aurem cum dextra manu ante ortum solis. Hoc fac tribus diebus summo mane et dic sibi in aurem: quando dominus noster, Iesus Christus, natus fuit, bene natus fuit; hoc quod dixit verum dixit, hoc quod fecit bene fecit, beatus dominus deus . . . . . ? dic Pater Noster per totum et Ave Maria et postea dic: sic credo, quod equus iste sanetur ab hac infirmitate farsi; et cuiuscumque coloris sit equus, iste color nominetur; et hoc totum dic sibi ter in aurem hiis tribus diebus et trahe equum circa ter post solem."

"For the farcy of horses, commonly called *vermis*, which erodes between the skin and flesh: Take the horse by the right ear with your right hand before sunrise. Do this early in the morning for three days and say into his ear: 'When our Lord Jesus Christ was born, he was well born; when he spoke, he spoke the truth; what he did was well done; blessed be the Lord God.' Then say the Pater Noster all through and the Ave Maria and afterward say: 'Thus I believe, that this horse will recover from this infirmity of the farcy.' Whatever may be the horse's color, let that color be named. Say all this to him into his ear three times in the three days and lead the horse about, three times after sunset."

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Viaticum. See Constantinus.

Vindician. Epitome altera. In: Rose, Theodori Prisciani Euporiston, q. v.
The passage describing the skeleton occurs also in the Lecciones Heliodori, Sigerist, 1921, q. v. and in the Ars Medicinae published by R. Laux, 1930, q. v.

PLATE I. Cushing manuscript of the Bamberg Surgery. Fol. 20 recto.

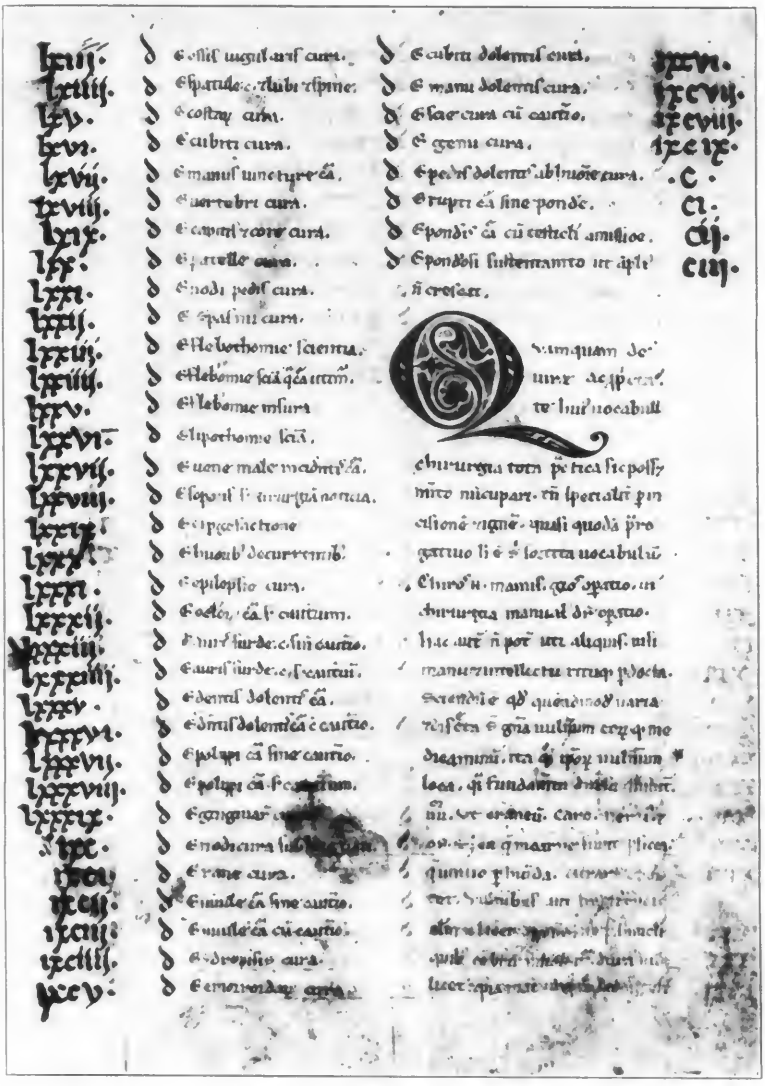


PLATE 2. Fol. 26 verso.

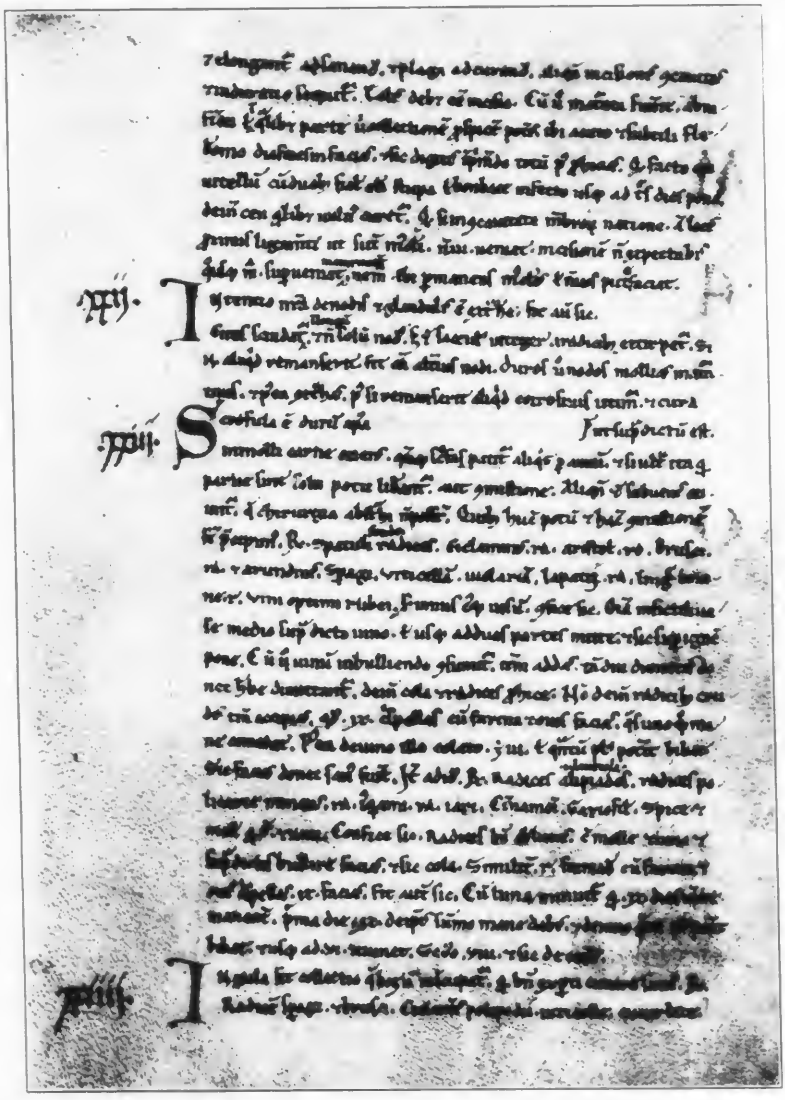
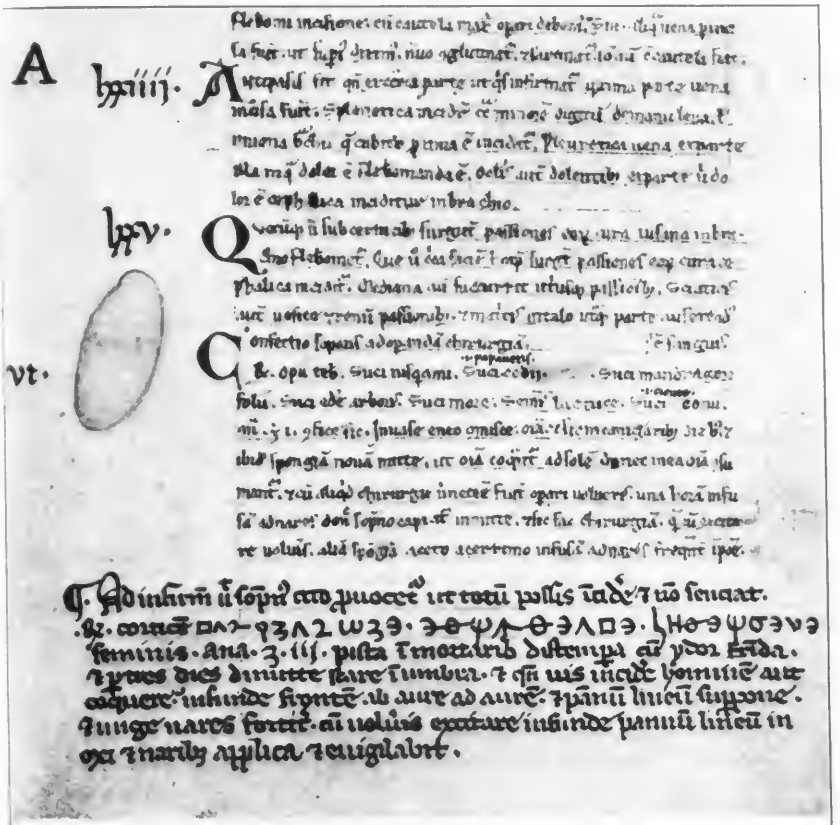


PLATE 3. Fol. 31 verso.



A

B

Plate 4. Above, Fol. 38 verso, lower part; below, Fol. 41 recto, lower part.

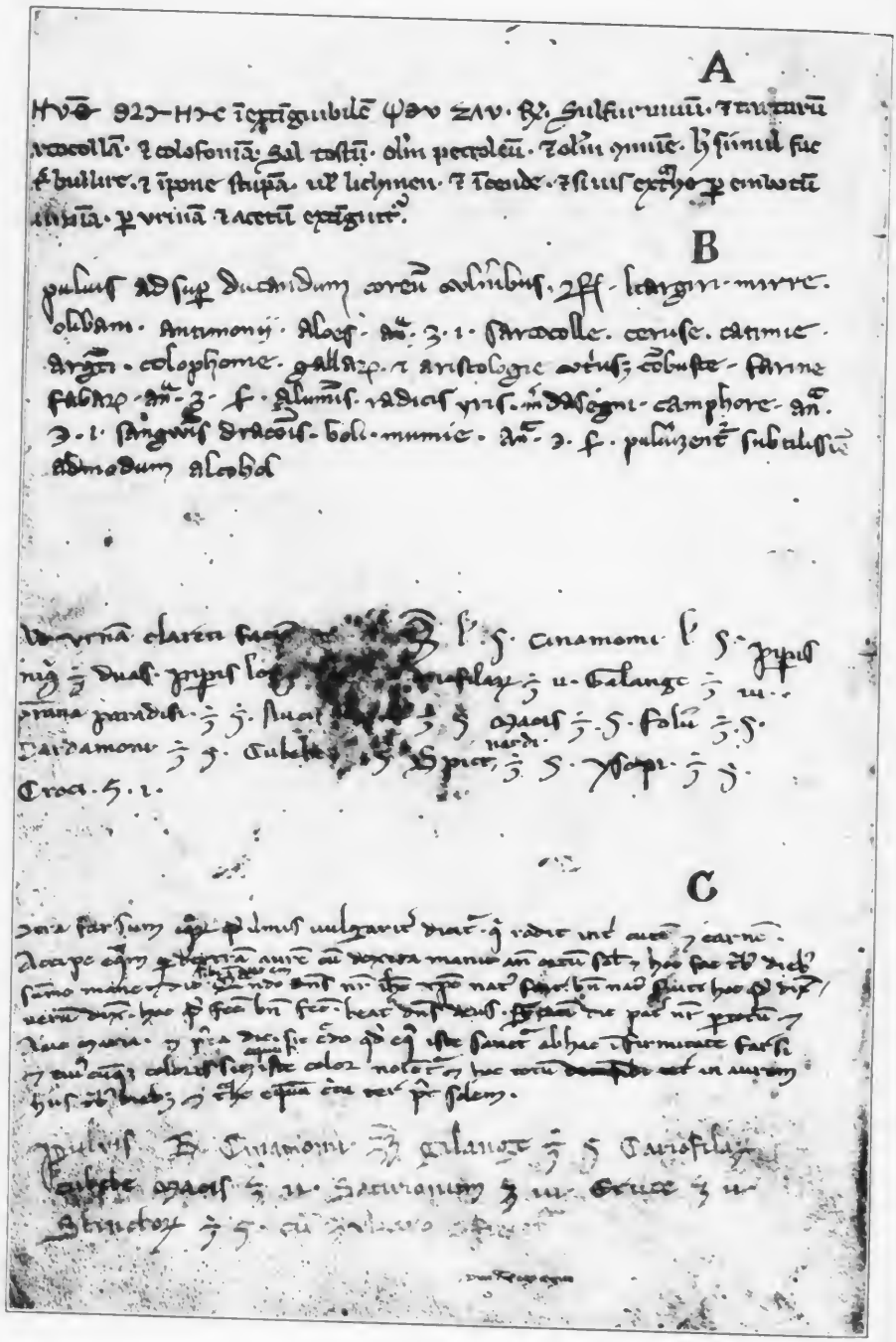


Plate 5. Fol. 41 verso.

WAS VON BAER'S DISCOVERY AN ACCIDENT?

"Die Wahrheit soll nicht verletzt werden."—VON BAER.

A. W. MEYER

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Everyone familiar with progress in or the history of science is aware of the fact that many discoveries have been avowed accidents. Many more, no doubt, were accidents though not avowed! Others were frankly declared to have been accidents at the time they were made and by those who made them, but this was later overlooked or forgotten, not only by others but also by the discoverer himself. This seems to have been true of Karl Ernst von Baer and his discovery of the mammalian ovum.

It would seem that someone, writing on von Baer, must have mentioned the contradiction in his accounts, but I have been unable to establish this. Neither Stieda nor Haacke mentioned the contradiction, and I do not recall reading anything to that effect or hearing anyone call attention to von Baer's conflicting versions of his discovery. Indeed, until I secured a photostatic copy of the Commentar, I was unaware of von Baer's earlier account of his famous discovery, which differs so decidedly from that in his Autobiography. It is true that von Baer always stressed the rôle of luck in this connection, but this could not carry the full implication of the facts and usually has been attributed to modesty on his part.

There also are conflicting opinions and statements regarding the nature of the Commentar. In the introduction to the German, centenary edition of the renowned Latin Epistle, the editor, Doctor B. Ottow, stated that von Baer published the Epistle on the formation of the egg, *in a decidedly changed version*[1] (*weitgehend geänderter Fassung*), in the German language, in 1828, although in the bibliography appended to his Autobiography, von Baer said (p. 459) that the contents of the above-named Epistle *is here* (in the Commentar) *repeated in slightly changed composition* in the German language. These words convey an entirely different idea than that

[1] The italics introduced throughout this article are my own.

given by Ottow or that expressed by von Baer himself in the body of the Autobiography (p. 321), in which he spoke of its as a comprehensive (*ausführlichen*) Commentar, which it is in fact. This estimate of it was also accepted by von Baer's biographer Haacke. Stieda, on the other hand, barely mentioned the Commentar, but since the original monograph contained over twelve thousand and the Commentar over seventeen thousand words,[2] and since many facts are introduced in the Commentar which are not contained in the Epistle, there can be no doubt that the former not only is a comprehensive commentary on the latter but also an important supplement to it. To regard the Commentar as a translation into German of the Epistle, would be a grievous error, and since Ottow added that the former is almost wholly unknown to-day (1927) and more difficult of access than the original Latin Epistle, republication of it would seem to be highly desirable. However, what concerns me here is the emphatic statement in the Commentar that the discovery of the mammalian ovum was in no sense a triumph of prolonged and careful effort but purely accidental and hence wholly devoid of the dramatic circumstances with which later years surrounded it.

It will be recalled that in the later account summarized here from the Autobiography (pp. 310-12), without dramatic style and detail, von Baer, after reviewing the efforts of previous investigators, said that he had seen small transparent " ova " one half to one and a half lines in diameter, in 1826, and that he thought that younger stages probably would be more opaque on account of the presence of yolk. He had surmised that mammalian ova come fully formed from the ovaries and had spoken of this to Burdach in the spring of 1827, adding that he greatly desired a bitch which had mated several days before. Since Burdach's house dog was in this state, it was offered to von Baer, isolated for two days and sacrificed eighteen days later. Upon inspection of the ovaries, von Baer was disappointed to find that several follicles had ruptured, but upon looking again,

[2] It should be added that although the original Latin Epistle contained a little over twelve thousand words, the translation of it into German in the centennial edition, contained approximately sixteen thousand words. The Commentar, which was originally written in German, hence is only slightly longer than the translation of the Epistle into German.

he noticed a little spot in an unruptured follicle and then also in others. Wondering what these spots were, he removed one of them to a watch-glass and examined it with a microscope. He said that he was so overcome with emotion by the thought that it was an ovum that he almost lacked resolution to look again for fear he had seen a phantom, but he confirmed his observations in the presence of Burdach, showing him a number of the ova.

Anyone with this conception of the discovery will probably be as surprised as I was when I first read von Baer's detailed, diametrically opposite statement in the Commentar. Here, after saying that many futile attempts had been made by fully competent persons, to discover the mammalian ovum, often under the stimulus of prizes, von Baer declared (p. 127) that he lacked the resolution to begin a search for it and that had he done so it would have been under a handicap because he sympathized with the view current at the time, that the Graafian follicle is the mammalian ovum. But, added he, " A lucky accident served me better. While I was inspecting the ovary of a bitch *only with the purpose of comparing the structure of this organ with the ovaries of other animals which I had investigated, and wholly without hope of discovering the ovum* which I had the less reason to expect because the animal was pregnant, I saw a yellowish little body (*Körperchen*) in each Graafian vesicle,[8] with unaided eyes and without the least care, which declared itself as an ovulum under the microscope." Von Baer's recognition of so tiny a speck in the Graafian follicle has often been attributed to the possession of unusually acute eyesight. This, to be sure, he might have had in spite of being myopic, but it is much more likely that his was the prepared mind and that he hence had unusual insight as well.

Von Baer said that he, of course, followed his find as time and opportunity permitted, with regard to the further development of the egg and in other forms of animals, and that it pleased him that the result of his investigations seemed to reconcile conflicting opinions and seemingly opposed observations, declaring that " Graaf was right in his observations, only wrong in his conclusions."

On page 128 of the Commentar, von Baer added that he used this

[8] Von Baer invariably uses the word *Bläschen* or vesicula instead of *Blase* or vesicle, which is the current term now.

discovery in a " Gelegenheitsschreiben " under the title of the Epistle and (on page 166) he gave a totally different account than in his Autobiography, of the part played by Burdach's dog. In the Commentar, after saying that he had long been desirous of finding earlier stages of dog-embryos than that represented in figure 7 of his Epistle, because this seemed to promise the most reliable key to the interpretation of the membranes, he said that his friend and colleague, Burdach, who had taken the liveliest interest in these investigations, had the kindness to offer him his own bitch but that this was *long after the Epistle had been sent away* (for publication). Since von Baer said in the Autobiography that Burdach's bitch was placed at his disposal in April or early May 1827 and that he sent the manuscript of the Epistle to the publisher in the middle of July of that year, the conflict in statement is obvious and irreconcilable. As is well known, July 14 is the date at the end of the Epistle itself, and although von Baer further said, in the Commentar (pp. 166-67), that he discovered younger " eggs " in Burdach's dog than he had seen before, since they were one third of a line in diameter, it is evident that there must have been blastocysts and not ova in the Graafian vesicles. According to figures 1 and 2 of the Epistle, von Baer found the dog ovum to be approximately one tenth of a millimeter in diameter and he emphasized in the Erläuterung to the plate that the dog ovum together with the " discus proligerus " is so small that the copper engraver could not represent it correctly, it being barely visible to acute eyes.

It should also be noted that in the very beginning of the Commentar, von Baer stated that he discovered the ovum in the " previous " winter, that of 1826-27, which is also the date accepted by Haacke and Stieda. Moreover, since the Epistle was dated July 14, 1827 and the Commentar appeared in January 1828, the latter must have been written soon after the former, as von Baer himself said, and at a time when the true sequence of events must hence have been clearly in his mind. Furthermore, in the Epistle von Baer specifically said that he discovered the dog ova in the Graafian vesicles themselves, without mentioning Burdach at all, and in the Commentar he said he conceived the writing of it while engaged with the Epistle.

It seems extremely unlikely to me that von Baer could have done

all the investigations implied in the Epistle, made the drawings and composed the Latin text, which he said gave him some difficulty, in the few months between the end of April or beginning of May, and the fourteenth of July, 1827—the date of the Epistle. This seems improbable also because von Baer said that he sent the drawings to the printer a considerable time before he sent the manuscript. Although in his Autobiography von Baer spoke only of having seen transparent " ova " (blastocysts) one half to one and a half lines in size in the winter of 1826, there seems to be little doubt that he discovered the ovum at that time. Had he done so in the month of April or May, 1827, it is exceedingly unlikely that he would have begun the Commentar with the words " *Im vorigen Winter.*" He would very likely have written *Im vorigen Frühjahr* or *Frühling* instead, as he did in the Autobiography (p. 310).

It is perplexing that von Baer stated on page 166 of the Commentar that he received Burdach's dog long after the manuscript of the Epistle had left him, for that apparently was not the case, and that he also said there that he discovered the place of formation of the mammalian ovum in the winter of 1826 and in the Epistle actually represented it as a tenth of a millimeter in diameter, but nevertheless spoke of these " ova " as transparent and as one half to one and a half lines in size, in the Autobiography. It is easy to understand how anyone writing in haste and under pressure, in old age, of events that occurred long before and in a totally different scientific atmosphere, might forget details and might recall those events as actually having happened in the light of a later day. However, this cannot account for the earlier discrepancy between the date of submission of the manuscript of the Epistle to the publisher and the acceptance of Burdach's dog by him, a fact regarding which he could scarcely have been in doubt when writing the Commentar.

Since von Baer also gave widely divergent estimates of the Commentar in the Autobiography, one might assume that he was careless with regard to what concerned himself, but this does not seem to have been the case. He undoubtedly was an acute observer, a sound thinker and truthful recorder of what he saw, and this leaves one wholly without an explanation for the discrepancies in dates and statements to which I have directed attention. It seems preferable

to me to accept the earlier version of the discovery of the mammalian ovum as correct, for it was recorded with emphasis at the time and when von Baer was only thirty-six years old and in the full possession of his powers. The poetic version, on the other hand, was written hastily in his declining years and under the pressure of a Golden Jubilee. Under such circumstances anyone might well see his achievement in the glamor of a later day, and it has been said that von Baer himself was dissatisfied with his Autobiography, written in his seventy-second year.

Since von Baer stated in the Commentar that he found younger stages of " ova " than any he had seen before, in the dog given him by Burdach, I know of no adequate reason for thinking that he felt so antagonistic to his teacher in 1827, as to rob himself of major credit by attributing his discovery to a pure accident, merely to deprive his teacher of credit for generously providing the dog upon which the discovery was made. To have done so would have robbed himself of much and Burdach of but little, and dishonored his own discovery. Since the Commentar was written immediately after the discovery, when von Baer was not an impetuous youth but a man of thirty-six years, such conduct would seem too vindictive and unreasoning. However, I am reminded that Bast declared that:

" Burdach was a crank on systematizing and so took the liberty to make changes in a number of places without consulting Baer. Baer resented this severely. Besides this Burdach took the liberty of giving a preliminary account of Baer's most recent discoveries before Baer had considered them sufficiently ripe for publication. Baer was so furious that he without Burdach's knowledge published his contribution together with additions and modifications under the title ' Ueber die Entwicklungsgeschichte der Thiere.' In his preface he excused the appearance of the book by stating that Burdach had changed his contribution to such an extent that it did not carry his ideas. In his autobiography Burdach shows no hard feelings against Baer but to the contrary holds him in high esteem. . . ." (p. 43).

In the introduction to the first volume of his Entwicklungsgeschichte, which also appeared in 1828, von Baer wrote without rancor (page x) regarding the matters of disagreement between

Burdach and himself and even expressed his indebtedness to the latter. However, in his Autobiography, he wrote a spirited and detailed defense of approximately thirteen pages, to the charges made against him in Burdach's autobiography. Anyone who reads Burdach's charges as quoted by von Baer, beginning on page 334 of the latter's Autobiography, cannot help being impressed with their severity and antipathy, traits which von Baer's aggrieved words in self-defense significantly lack.

In his Autobiography, von Baer called attention to the fact that Burdach did not bring these very serious charges against him until twenty years later, and then in an autobiography, his *Rückblick auf mein Leben*. Although Stieda merely said that von Baer was displeased with changes made by Burdach in his manuscript, there can be little doubt, it seems to me, that von Baer's displeasure in regard to what had occurred in connection with his manuscript on development submitted for inclusion in Burdach's Physiology, was deeper than his dispassionate statement on page x of the *Entwicklungsgeschichte* would lead one to infer. Burdach's serious charges against von Baer also suggest this and on page 342 of his Autobiography, von Baer declared that " On page 62 of volume two of the Physiology, there is a comprehensive polemic against an interpretation in my Epistle." Since this volume appeared in 1828, von Baer could not have been cognizant of this criticism when he wrote the Commentar in 1827, unless he had seen the proof and protested in adavnce. However, he probably was especially sensitive to it because he said that in the Commentar he had changed his original interpretation and that since the Commentar had appeared simultaneously with, or even before, the Epistle, his changed opinion must have become known to Burdach. However, since volume two of Burdach's Physiology also appeared in 1828 and the Epistle and Commentar in January of that year, it is possible that Burdach did not learn of von Baer's changed attitude in time to modify the offending paragraph 342 of the text, in which (p. 65) it is stated that according to von Baer's discovery, a dark, large-grained sphere, with a small cavity, lies within the shell membrane and separated from it by a clear interspace. This the writer said implies that the vesicle concerned is thick-walled and he added that von Baer regarded

it as the vitelline membrane within which the germinal membrane (*Keimhaut*) forms but that this conception is opposed by the following reasons. The writer then listed four opposed grounds and added that von Baer himself had not seen the germinal membrane form within the vitelline membrane.

This discussion is included in not quite two and a half of the four and a half pages which constitute paragraph 342 in the first edition, and is entirely without animus. It is probably not without significance, however, that all reference to von Baer is excluded from the same paragraph in the second edition, and that the paragraph was reduced from almost four and a half pages in the first edition to a little over a half a page in the second. However, von Baer's name appeared as collaborator on the title page of volume two of the first edition of Burdach's Physiology and likewise on the same pages of volumes one and two of the second edition of this work, which appeared in 1835 and 1837 respectively. In the latter volumes, which deal with generation and development, von Baer's name appears repeatedly, his investigations are summarized accurately and his opinions treated with respect. After summarizing von Baer's erroneous opinions regarding the Graafian follicle, for example, it merely is stated that further investigations have not confirmed these ideas, and when the nucleus of the ovum is mentioned, it is stated that Purkinje discovered it in birds in 1825 and that von Baer recognized it, in 1827, in other egg-laying vertebrates and also in molluscs, annelids, crustacea and insects.

Although Stieda said that the discovery of the ovum was an accident, he did not refer to the statement in the Autobiography nor to the Commentar and his words seem to have been completely ignored. The sole currency of von Baer's later account of the discovery of the ovum no doubt is due to the fact that his Autobiography is well-known and his Commentar practically unknown. His emphasis on good luck, even in later years, however, is probably not an embellishment, for it is in accordance with the facts recorded by him at the time of the discovery. The significance of this momentous discovery is, to be sure, not affected in the least by the manner in which it was made. Nevertheless, from the standpoint of the historian, the true facts are of paramount importance. This also is in accordance with

von Baer's own declaration that " Truth should not be impaired," (" Die Wahrheit soll nicht verletzt werden.") and is the apologia mia for this article. Moreover, paraphrasing his own words, " There are some things about Karl Ernst von Baer which I do not understand." Perhaps some reader can enlighten me regarding them.

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THE MONTEREY SURGEONS DURING THE SPANISH PERIOD IN CALIFORNIA

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Foreword

The progress of medicine in California has been recounted in a number of excellent works, ranging from the rather fragmentary treatment by the general historians such as Bancroft and Hittell to the comprehensive treatises of Lyman and Harris.[1] In all these books and pamphlets the reader may trace the influence of the medical profession, follow the gradual solution of many interesting problems in public health, and become acquainted with the ills and ailments, as well as the treatments and remedies common to the inhabitants of the state from its earliest beginnings. It is not the intention of the present writer to discuss these matters here, but to call attention to a particular group of men who were the sole representatives of the medical profession in California for some fifty years. These men were the so-called Monterey surgeons, or government physicians sent by the Spanish colonial authorities to look after the health of the distant provincials in upper California. Very little is actually known of these first California physicians and much of what is known has already been set forth by the writers mentioned above, and by others. However, no systematic attempt has been made to discover additional facts and to present in one account the available information concerning these obscure but significant individuals.

When the Portola-Serra expedition set forth to colonize upper California a medical man was a member of the group. From that time, 1769, up to the end of Spanish dominion, in 1822, with a few

[1] Bancroft, H. H. Works. All volumes covering California contain material pertinent here.

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Lyman, G. D. The Scalpel under Three Flags in California. Calif. Hist. Soc. Quart., 1925, vol. 4, pp. 142-206.

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interruptions, some physician was always in the province. As far as can be judged these physicians actually accomplished relatively little, aside from local practice in the region of Monterey and San Francisco. Obviously the task was too great for any one man to be concerned personally with the health and illnesses of several hundred or thousand white persons and many thousand Indians. However, their significance cannot be assayed on a basis of cures performed or patients attended. The vital fact is that the physician at Monterey, whatever his personal endowments, represented one of the few permanent foci of culture present in California for many years, and was substantially the only representative of the arts and sciences. Aside from him only the clergy and the military held an official status, and although naturally in influence the two latter groups far outweighed him, still qualitatively he stood as their equal.

The Monterey surgeons with the usually assigned dates of their tenure are as follows:

Pedro Prat	1769-1771
Pedro Castan	1773-1774
José Dávila	1774-1783
Pedro Carbajal	1786-1787
Pablo Soler	1791-1800
Juan de Dios Morelos	1800-1802
Manuel Torres	1802-1803
José Maria Benites	1803-1807
Manuel Quijano	1807-1824

Pedro Prat[2]

It is known that Pedro Prat, in 1769, was a surgeon in the Spanish army, holding the rank of captain. Concerning his origin there is uncertainty. Bancroft refers to him as a Frenchman, but says he

[2] With respect to all the Monterey surgeons the primary source is the California Archives. The original archives were destroyed in the San Francisco fire but full transcripts exist in the Bancroft Library. Direct references here are to and quotations are from this set of manuscripts and abstracts. However, certain documents are referred to by Bancroft and Hittell, which were not copied—or not even mentioned—by Bancroft's copyists. Our only present guide to the content of such documents is the statements made concerning them by earlier writers.

was a native of Barcelona, where he attended the University and received a degree. The idea that Prat was a Frenchman is derived from his contemporaries. Thus Palou [3] refers to the " French surgeon Don Pedro Prat." However, Harris [4] holds the opinion that he may have been a Spaniard and a Catalan, since he was a native of Barcelona.

Whatever his antecedents, Prat appeared on the scene in 1769 as a member of the group which sailed from La Paz for San Diego on the *San Carlos*. The story of that ill fated expedition has often been told—how the crew of the *San Carlos* was decimated by scurvy, how the ship barely reached port, and how, after landing, the afflicted crew was cared for in improvised shelters and tents. The disease was overcome, but not until some ninety persons had perished. In the struggle against famine as well as scurvy the two most conspicuous leaders were Junipero Serra and Pedro Prat. It cannot be maintained, of course, that anything approaching modern medical skill was exercised by Prat, and it is doubtful to just what extent his measures were efficacious but there can be no question that he showed the most tireless devotion to his task and materially alleviated the sufferings of the victims. Indeed, so meritorious was his service that he earned the enconiums of all those who have left written record of the time.

The *San Carlos* arrived in San Diego April 29, 1769 (Bancroft), twenty days after her consort the *San Antonio*. For several weeks the principal effort of the colonists was to care for the sick. Of Prat's activities during this period Costanso [5] says:

" Medicines and fresh food, most of which had been used up on the voyage were wanting. The surgeon, Don Pedro Prat, supplied this want as far as possible, with some herbs which he sought with much trouble in the fields and whose properties he knew. He himself needed them as much as his patients, for he was all but prostrated by the same disease as they (i. e., scurvy)."

From this account it is clear that Prat was unable to prevent himself from falling a victim to scurvy whether through ignorance of

[3] Palou. Life of Serra, Ed. S. W. James, 1913, p. 77.
[4] Calif. Med. Story, 1932, p. 22.
[5] Costanso, Miguel. Diario Historico de los viajes, etc. Trans. F. J. Teggart. 1910. Publ. Acad. Pacific Coast Hist., vol. 1, p. 33.

the correct treatment or through inability to secure fresh food. Nevertheless the extent of his devotion to his work is apparent from the fact that, although partially incapacitated, he still made every effort to bring aid to the afflicted. The suggestion that he sought in the fields for herbs " whose properties he knew " indicates that he probably had some prior experience in the American sub-tropics, possibly on the west coast of Mexico. A physician recently arrived from Europe would scarcely expect to find herbs familiar to him in the vicinity of San Diego.

About three weeks after the arrival of the *San Carlos* a new and better camp was constructed to which all hands, sick and well, were removed. There " it was possible to attend with greater care to the sick, whom the Surgeon, Don Pedro Prat, did not leave for a moment and nursed with the utmost kindness." [6]

On July 14, 1769, Portola left San Diego on his famous land expedition in search of Monterey. Prat was to remain in San Diego to care for the sick. Costanso [7] says:

" There was left at San Diego a guard which seemed sufficient for the protection of the mission and of the sick, with the surgeon, Don Pedro Prat, so that he might continue to attend them."

Portola also recorded [8] that: " . . . surgeon Don Pedro Prat was left in this vicinity with the sick."

Prior to the departure Portola evidently consulted Prat with respect to the capacity of certain persons to make the strenuous journey, for he wrote the viceroy on July 4 that he contemplated taking with him a number of men, whom he named,

" Of whom the surgeon says that during the march and with a change of climate they will recover their strength and health." [9]

While the expedition was absent, Prat continued to nurse the sick and bear the burden of maintaining the health of the establishment. It was during this period (August 15, 1769) that an Indian attack

[6] Costanso, Miguel. Diario Historico de los viajes, etc., vol. 1, p. 35.
[7] Costanso, Miguel. Diario Historico de los viajes, etc., vol. 1, p. 39.
[8] Portola, Gaspar. Letter to Croix, July 4, 1769. Bancr. Transcript.
[9] Portola, Gaspar. Letter to Croix, July 4, 1769. Bancr. Transcript.

occurred as a result of which there were several casualties. Palou [10] says in this connection that

"The charitable surgeon Don Pedro Prat, immediately gave medical attention to the father who was wounded and to the blacksmith."

On January 24, 1770, Portola's company returned to San Diego. What they found may be described in the words of Costanso: [11]

"We learned . . . how that a few weeks after our departure, God had taken to himself all those we had left sick in their beds: but that through the charitable and tireless devotion of the surgeon, Don Pedro Prat, those in whom the disease had not taken such a firm hold during the sea voyage had recovered. . . . Experience thus proved in this instance, how opportune was the wise decision of him who sent a man of this profession and of such commendable ability, and how useful such persons are in any colony or settlement."

And also of Palou: [12]

"The sick men continued to suffer from the scurvy although the celebrated surgeon endeavored to use all possible means to relieve them; though he cured many the medicine failed to save nineteen who died during the period from the founding of the mission to the return of the expedition."

Costanso [13] further states that:

"The missionary fathers, as well as the surgeon, Don Pedro Prat . . . were recovering from the common malady, for the contagion had not spared a single person of those who were included in the expedition."

Later in the spring the majority of the settlers proceeded to Monterey, one part with Portola by land, leaving San Diego April 17, 1770, and another group on board the *San Antonio* which cleared from San Diego the previous day. Prat made the trip by sea for "The commander (Portola) decided that . . . the surgeon Don Pedro Prat should go with the packet." [14] The ship arrived safely on May 31.

[10] Palou, Francisco. Hist. Mem. of New Calif. Trans. H. E. Bolton, 1926, vol. 2, p. 270.

[11] Costanso, Miguel. Diario del Viaje de Tierra, etc. Trans. F. J. Teggart. Publ. Acad. Pacific Coast Hist., vol. 2, p. 325.

[12] Palou, Francisco. Hist. Mem. of New Calif. Trans. H. E. Bolton, 1926, vol. 2, p. 271.

[13] Costanso, Miguel. Diario Historico de los viajes, etc., vol. 1, p. 59.

[14] Palou, Francisco. Hist. Mem. of New Calif. Trans. H. E. Bolton, vol. 2, p. 279.

Meanwhile certain medical supplies were sent along. These were to be placed in charge of Prat who would dispose of them in accordance with his instructions. The latter were set forth by the viceroy [15] thus:

"The packet (*San Antonio*) is taking to Monterey two cases of medicines which Fages will place in charge of surgeon Don Pedro Prat who will give part of them to the missionaries situated at a distance from the presidio with the necessary instructions for their use. . . ."

The fate of these medicines remains shrouded in mystery. For some reason Prat never opened them (see below), a delinquency which served as an important item in subsequent complaints against him.

For a relatively brief period after his arrival at Monterey Prat continued with his duties and seemed to be in reasonable health. He passed a professional opinion on four sailors of the *San Antonio,* stating, that since they were in bad shape they should remain at Monterey and not return with the ship and be "exposed to the sea.[16] But apparently his heroic struggle with scurvy at San Diego and the hardships of the past months had undermined his health. At least that is the generally accepted explanation for his subsequent breakdown. However, there may have been trials of a non-physical nature which exhausted his strength. There are indications of this in the following passages. Thus Serra tells the story that during the San Diego period while Prat was exerting himself to the utmost, Fages personally appropriated the food designated for the sick. When a certain corporal Miguel Periquez went to the ship

". . . by commission of the surgeon he requested of the captain of the bark . . . what was needed to feed the sick. . . . But Don Pedro Fages took away what he was carrying . . . this being the cause of great grief to the surgeon Don Pedro Prat." [17]

On leaving for Monterey, Fages, according to Serra, left no provisions for the sick at San Diego. Serra then proceeds to relate the following incident which apparently occurred at Monterey shortly after the settlement,

[15] Croix, Marques de. Letter to Fages, Nov. 12, 1770, Mexico City. Cal. Arch. Prov. St. Pap., vol. 1, p. 69.

[16] Fages, Pedro. Letter to Croix, July 1, 1770, Monterey.

[17] Serra, Junipero. Reclamo sobre la conducta de Pedro Fages, 1773. Bancr. Transcript.

"I, the corporal (Periquez), having fallen ill at Monterey . . . and having on the orders of the surgeon taken to my bed in order to recover, not only did he (Fages) refuse to allow the said surgeon to exercise his office, but also did he command me to arise immediately and go out to work. . . ." [17]

The above incident is also of significance in that it demonstrates that Prat was engaged in active practice for at least some time after his arrival in Monterey. The following events may have occurred either at San Diego or Monterey, but the tenor is the same as the foregoing:

"On another occasion, having injured my leg . . . the surgeon put me under his care, but Don Pedro Fages did not permit me to go to bed. . . ." [17]

"In order to treat some sailors who were still suffering from scurvy the surgeon, with tears in his eyes, begged for some chickens which belonged to him . . . but could not get them. Don Pedro Fages replied to him that the treatment of those men was his responsibility and the only medicine he would give them was the scanty ration in common use by everyone. (He said) that more would die of hunger than of sickness, and although the surgeon wept at seeing he could not cure them (the invalids) because of lack of food, even though there were then a great many chickens at hand, nevertheless Don Pedro (Fages) said they were all destined for himself. . . ." [17]

As suggested above, Prat seemed to be fairly healthy and active on his arrival at Monterey and for an undetermined time thereafter. However, within a year his mind failed completely. In June of 1771 Fages wrote the viceroy to the following effect:

"In agreement with the Rev. Father President of these missions, Father Junipero Serra, I am placing on board the packet *El Principe* for return to San Blas, the surgeon Don Pedro Prat because I consider him useless at this presidio. The reason is that as I have observed him during the time he has been in my company, his ailment, hypochondria, has reached the border of insanity. I hope that this decision will be satisfactory to your Excellency, with respect to the insufficiency caused by the illness of this subject." [18]

One might imagine that the autocratic Fages would be capable of using any excuse to rid himself of a person with whom his relations had not been pleasant. However, that Fages did not overstate the case is proved by the account of the sympathetic Serra:

"I call to the attention of your Excellency that fact that at the beginning of the expedition a surgeon named Don Pedro Prat was assigned to it. When

[18] Fages, Pedro. Letter to Croix, June 20, 1771, Monterey. Bancr. Transcript.

we went to Monterey the bark carried a large quantity of medicines so that the surgeon, reserving what was necessary for the presidio might distribute to the missions what he thought best, writing in a memorandum book the virtues of what he gave them. But we had the misfortune that no sooner was the port of Monterey found than the surgeon lost his mind. He remained one year in the presidio but totally demented; he was afterward sent away in the bark and finally died in the hospital of the Bethlemite fathers at Guadalaxara." [19]

Thus, according to the only first hand account we possess, passed from the scene Pedro Prat, the first California physician, and the most devoted if not the ablest medical man to touch these shores for seventy-five years.

Pedro Castan and José Dávila

The breakdown of Prat created a vacancy at Monterey. That this should be filled at the earliest opportunity was generally conceded. In fact, Serra requested a new surgeon by the same letter in which he informed the viceroy of Prat's removal,[20] saying that there were already divers cases of wounds and the like which demanded the care of a professional man. The response to Serra's request came relatively soon in the appointment of José Dávila, a naval surgeon. However, there were some complications which arose when he undertook to assume his duties. Just at that time Juan Perez was starting his expedition to explore the northwest coast and evidently also wished to secure the services of Dávila. His own surgeon at the time appears to have been Pedro Castan.[21]

A compromise was proposed (and carried out) whereby Perez would take with him Dávila and leave Castan at Monterey during

[19] Serra, Junipero. Representation to the Viceroy. In Palou, Hist. Mem., Trans. H. E. Bolton, vol. 3, p. 31.

[20] Serra, Junipero. Representation to the Viceroy. In Palou, Hist. Mem., Trans. H. E. Bolton, vol. 3, p. 31.

[21] There is some lack of uniformity in the spelling of the names of these two physicians. Bancroft refers to Pedro Costan. Elsewhere the name is spelled Castan. Harris (Cal. Med. Story, p. 25) thinks that the name was a corruption of Castany. Dávila appears spelled Davila, Dávila, D'Avila, De Avila and Avila. Probably Dávila is the most nearly correct.

Other names as well are subject to variation in spelling. Thus Carbajal is often spelled with a "v"; Benites with a "z"; Quijano with an "x."

the interim. Thus Bucareli, the viceroy, wrote only six months after Serra's letter that

". . . he informs him that the new frigate (*fragata*) *Santiago* under command of Don Juan Perez is designated for the discovery of these coasts; that in her is going the surgeon Don Pedro Castan with thirty pesos monthly (salary); but since Perez prefers Don Josef Dávila, the latter will be permitted to go with the expedition, leaving Castan on land to take his place." [22]

At the same time Rivera y Moncada was written substantially to the same effect:

". . . Captain Rivera y Moncada is notified by the Viceroy that the surgeon Don Pedro Castan has orders to remain at Monterey until the return of Don José Dávila, *who is the surgeon appointed for the presidio* (italics mine)." [23]

These plans were carried out. Certainly Dávila and probably also Castan sailed with Perez from San Blas on January 24, 1774. Bancroft [24] says he was accompanied by "his family." Such may well have been the case since Dávila was married. The *Santiago* arrived at San Diego March 13, 1774, remained about a month, put to sea again on April 5 and reached Monterey May 7. The projected expedition for the northern coasts sailed from the latter port on June 11, 1774. Dávila accompanied Perez, as arranged, "the vessel's surgeon, Costan, remaining temporarily at Monterey." [25]

Thus for a few weeks Castan held the post, and although absolutely no record remains of any events which occurred during his tenure, and although he must be regarded only as a *locum tenens* for Dávila, still his name should be retained on the list of Monterey surgeons.[26]

[22] Bucareli, Letter to the Commandant of Monterey, December 24, 1773, Mexico City. Cal. Arch. Prov. St. Pap., vol. 1, p. 137.

[23] Bucareli (probably), Letter to Rivera y Moncada, December 24, 1773. Cal. Arch. Prov. St. Pap., vol. 22, p. 1.

[24] Bancroft, H. H. Works, vol. 18, p. 224.

[25] Bancroft, H. H. Works, vol. 18, p. 228.

[26] The tenure of Castan is variously reported. Harris (Calif. Med. Story, p. 23) says merely 1774. Bancroft (Works, vol. 34, p. 622) says 1773-1774. Lyman (Calif. Hist. Soc. Quart., vol. 4, p. 145) follows Bancroft. The first statement (i. e., merely 1774) is probably correct, for there is nothing to show that Castan arrived prior to Perez on May 7, 1774 (Castan was Perez' own ship's surgeon), or that he held office after the return of the expedition later in the same year.

The Perez expedition is of interest to the historian but apparently the health of its members was fairly good, and there was little call for the services of Dávila. Perez in his official report at least does not mention Dávila by name.[27] The ship returned on August 27, 1774, to Monterey and presumably Dávila took up his duties as surgeon at the presidio. The *Santiago* cleared for San Blas on October 9 and with it undoubtedly went Castan. At least no more is known of him in upper California. Dávila went on one more northern expedition the following year, under Lieutenant Bodega y Cuadra, but there is no record of his experiences. He returned on August 29, 1775, to remain approximately eight years.

Concerning Dávila's professional interests and activities during his tenure at Monterey we have no knowledge. The only items concerning him are personal in nature. It is on record that on December 28, 1779, he and his wife acted as god-parents (*padrinos*) to a number of Indians baptized at the Mission of San Francisco.[28] On April 25, 1782, he was present at the laying of the corner stone of the new mission building at San Francisco.[29] His wife died on November 10, 1780. The demise is reported thus:

"November 10, 1780. Dona Josefa Carabajal y Manchuca, wife of Josef Joaquin D'Avila, surgeon of these new populations and presidios, and at present resident in that of San Francisco."[30]

The above three citations indicate that for a considerable period at least, Dávila resided at San Francisco rather than Monterey. If so, it was somewhat at variance with the usual custom; for the surgeon, although he might move around as his duties required, nevertheless was expected to remain, and usually did remain at the more central station of Monterey.

The demise of his wife was followed after slightly more than a year by his espousal of another lady. For the Santa Clara records contain the following item:

[27] Perez, Juan. Relacion del Viage, etc. MS., Bancr. Library.
[28] Libro de Mision de San Francisco. Extracts by Savage, p. 12.
[29] Libro de Mision de San Francisco. Extracts, etc., p. 17. See also Bancroft, Hittell, Lyman, Harris.
[30] Libro de Mision de San Francisco. Extracts, etc., p. 64.

"9th Marriage, January 7, 1782. Don Joseph Dávila, surgeon of these new establishments, widower of Dona Josepha Carbajal, with Maria Encarnacion, single, legitimate daughter of Isidro de Castro, formerly of Sinaloa, soldier at this mission, and of his legitimate wife Martina Botiller." [31]

At about this time, for reasons unknown at present, Dávila became *persona non grata* with Governor Neve. Various writers have suggested possible causes of friction but the only available documentary evidence is contained in a letter from Neve to the Commandante-General, the abstract of which reads as follows:

"He says it is desirable to remove from these establishments the surgeon José Dávila, granting him the furlough (*licencia*) which he requests, since he is both incompetent in his art and captious (*pues a mas de corto en su arte es caviloso*)." [32]

To judge from the context, Dávila requested to be granted leave of absence. This request was heartily endorsed by Neve in November, 1781. Early the next year he was married and probably remained until 1783. Bancroft [33] thinks he left "before December 1783." There is a letter of Fages, dated Dec. 5, 1783, in which he refers to "the lack of a surgeon due to the removal of José Dávila." [34] This note indicates that Dávila retired during the year 1783.[35]

[31] Parroquia de Santa Clara. Extracts by Savage, Bancr. Lib., p. 40.

[32] Neve, Letter to Command. Gener., November 16, 1781. San Gabriel. Cal. Arch. Prov. Rec., vol. 2, p. 68.

[33] Bancroft, H. H. Works, vol. 18, p. 468.

[34] Fages, Pedro. Miscel. corresp. with Commandante General. Dec. 5, 1783. Cal. Arch. Prov. Rec., vol. 3, p. 185.

[35] Some curious misstatements have been made concerning the retirement of Dávila. There is little doubt that he, with his family left California, never to return. Bancroft (Works, vol. 18, p. 468) refers to his "departure." Fages [34] speaks of his "removal" (*Separacion*). Neve (Letter to Fages, April 1, 1784) says, *inter alia:* "Since the surgeon, José Dávila retired on leave (*retiro con licencia*) from these establishments (i. e., California). . . ." Yet Lyman (Calif. Hist. Soc. Quart., vol. 4, p. 196) states that ". . . in 1783 both men (Neve and Dávila) died and were buried in the mission church." Harris (Calif. Med. Story, p. 26) corrects the obvious error in Lyman's account by pointing out that there is no record of their burial at Monterey and adds merely that "By 1783 both the governor and the doctor disappear from the scene" without giving any indication of what might have become of either. Neve, of course, retired from the governorship in September, 1782, but was made Inspector General, a post which he held for some time afterward.

Pedro Carbajal

From the dismissal of Dávila in 1783 to the coming of Soler in 1791 there was no surgeon, properly speaking, at Monterey. During this interval, in which attempts were made to find an appropriate man, the position was filled apparently from time to time by Pedro Carbajal, a naval surgeon. Although he was present only in an acting capacity, nevertheless he was the only physician in the region from 1783-1791 who participated at all in California affairs, and therefore may be included in the list of Monterey surgeons. He is generally stated to have served from 1785-1787 but he may have been in the region at other times.

Shortly after Dávila retired Neve wrote to Fages, then governor, that a substitute had been requested.[86] Evidently on August 24, 1784, Fages himself wrote to the central government, since his letter is referred to in an answer dated November 29, 1784. In this letter [87] it is stated that the Real Audiencia (Royal Council) has asked the factor at San Blas to provide a physician together with such medicines as may be necessary.

In 1785 occurred the incident of Nicolas Soler, then "Ayudante Inspector" or inspector of presidios. The correspondence on this matter is fairly extensive but somewhat ambiguous. For the sake of completeness I will quote it at some length—not only because of its bearing upon the status of Carbajal but also as a side light upon the woes of the patient when no doctor could be found.

On October 25, 1785, Captain Goicoechea of the Santa Barbara presidio wrote to Fages to the following effect:

"He says that the Captain Ayudante Inspector (Soler) on account of finding himself laid up in bed since the day he arrived at this presidio, is not writing you, and he considers that his recovery is being retarded. Not finding any means of helping him we have taken the precaution of moving him to San Diego to solicit the aid of the surgeon Pedro Carbajal, requesting the commanders of both ships that he be allowed to remain this year, or at least that he (Carbajal) prescribe the regimen which he (Soler) should follow, together with the medicines which he regards as desirable." [88]

[86] Neve, Letter to Fages, April 1, 1784. Arispe.

[87] Herrera, Vicente de, et al. Letter to Fages, November 29, 1784, Mexico City.

[88] Goicoechea, Felipe de. Letter to Fages, October 25, 1785. Santa Barbara, Cal. Arch. Prov. St. Pap., vol. 5, p. 186.

A month later Captain Arguëllo of the San Diego presidio reported to Fages concerning Soler's condition that:

". . . he (Fages) would learn by the last post from Felipe de Goicoechea that since the second day of his (Soler's) arrival he was prostrated; that through ignorance remedies had been administered to him which were contra-indicated, making him worse; that he had nothing else but flux and diarrhoea; that from the wrong treatment he suffered impaired vision in one eye; that the surgeon of the packet *Aranzazu* had been requested to remain, it having also been undertaken to solicit financial compensation for him (the surgeon) from the viceroy; but that the great Martinez (*el famoso Martinez*) did not wish to grant permission for him to remain." [39]

Evidently, in spite of his objections, " the great Martinez " did leave his surgeon, for Bancroft [40] states that " . . . he induced the captain of the *Princesa* to leave his surgeon, Carbajal, for his convenience." The Soler incident occurred in San Diego, at which port Carbajal must have landed (if he did land) in late 1785 or early 1786. In any case he was at Monterey in 1786 for he is mentioned by the La Perouse party as being the surgeon at the presidio. Dr. Rollin says in his report on the local Indians: " I was assisted by Father Mathias, missionary, and M. Carbajole, surgeon in chief of the colony." [41] It can only be conjectured whether Carbajal stayed ashore at San Diego and went by land to Monterey, or whether he went in his ship by sea. Regardless of this question, it is sure that his active participation as surgeon of the colony at Monterey was relatively short.

Having arrived, let us assume, in early 1786, he was still there in early 1787. Fages, in a letter to the Commandant of Monterey, dated January 31, 1787, at San Gabriel forwarded certain orders concerning smallpox.[42] One copy was to be handed to Don Pedro Carbajal, indicating that the latter was at Monterey at this time. But very shortly thereafter the central administration in Mexico began to take official cognizance of the Nicolas Soler incident and

[39] Arguëllo, José de. Letter to Fages, November 3, 1785. Cal. Arch. Prov. St. Pap., vol. 5, p. 185.

[40] Bancroft, H. H. Works, vol. 18, p. 397.

[41] La Perouse, J. F. de la. Voyage 'Round the World. Eng. Transl., London, 1798. 1st Ed., vol. 3, p. 210.

[42] Cal. Arch. Prov. St. Pap., vol. 7, p. 154.

from the tenor of the remarks of the Real Audiencia it looks very much as if Carbajal's presence in Monterey were illegal or at least contrary to regulations. The Audiencia addressed Fages thus:

"It (the Real Audiencia) ordered that he should have the surgeon of the frigate *Princesa*, P. Carbajal, returned, since it was necessary to consider the general welfare of the crew above the particular welfare of Ayudante Inspector N. Soler; that Lieutenant E. J. Martinez had no authority to accede to his request, and that the surgeon should return to the port of San Blas; that in vain has every effort been made to secure a professor of medicine and surgery for those establishments, offering up to 200 pesos over and above the 450 assigned to that position; that on this date one (a physician) has been requested of the surgeon major of the royal hospital." [43]

The above communication makes it quite clear that Carbajal was not officially assigned to Monterey and that he was returned to his proper post early in 1787. His extra-legal tenure therefore can not have extended much more than a year.

It is also apparent from the foregoing excerpt that extreme difficulty was encountered in finding a man for the position. It was now four years since Dávila retired and the province—as indicated by the Solar experience—sorely needed medical attention. Yet a satisfactory man could not be obtained even by offering the large sum of 650 pesos per annum. Several factors probably contributed such as a relative scarcity of good practitioners in the then decandent Spanish America and the disinclination of otherwise qualified individuals to leave the center of culture in Mexico and bury themselves in the wilds of California. Be that as it may, it was not until 1791 that a permanent incumbent for the position was finally obtained.

Concerning Carbajal personally or professionally, aside from the Rollin statement, very little is known. His chief claim to distinction seems to have been his presence on the ship of Murelle during the voyage of the latter from Manilla to San Blas in 1781. During this voyage the crew suffered from scurvy and much of the food was consumed by an inundation of cockroaches. Carbajal participated in the ship's council and his advice was held in esteem.[44]

[43] Audiencia. Letter to Fages, Feb. 14, 1787, Mexico City. Cal. Arch. Prov. St. Pap., vol. 7, p. 2.

[44] Murelle's report is published in La Perouse, 1st Eng. Ed., London, 1798, vol. 1. For a brief but graphic account see Harris, Cal. Med. Story, pp. 26-27.

Pablo Soler

Information concerning the circumstances under which Pablo Soler took over the post at Monterey is contained in a letter to Gov. Romeu in 1791 [45] together with which the financial statement of Soler was forwarded to Monterey. According to the statement the surgeon had been receiving 70 pesos per month from the time he landed in Vera Cruz (on December 27, 1789) up till the present, i. e., August 25, 1791. In addition he received 1½ reales per day for commutation of rations. Furthermore, he had been credited with 300 pesos to defray the expenses of the land trip from Vera Cruz to San Blas. On the other hand, there had been deducted (from what was due him) certain sums (not itemized) already paid to him in Vera Cruz, Mexico City, etc., together with 120 "pesos fuertes" which had been withheld from his allowance by the Ministers at Guadelajara.

Certain points of interest emerge from the above communication. It is apparent that the colonial government, after years of search, was obliged to send to Spain for a competent surgeon. This may be inferred from the fact that Soler, a graduate of Barcelona and "cirujano de la Real Armada" arrived at Vera Cruz on the east coast toward the end of 1789. That the government had to pay high is shown by the annual salary of 840 pesos (the original stipend was 450 pesos) which started when Soler landed at Vera Cruz if not even previously, and by the 1½ reales per day plus 300 pesos as a blanket sum for travelling expenses.

Although there is no record of his actual arrival at Monterey, Soler must have reached there late in 1791 for he was in San Blas in August. Presumably he took up his duties without delay.

There are several references in the contemporary documents to the activities of Soler during his term of office. These, although not always of great consequence, are of interest as exemplifying the type of incident which was the lot of a Monterey surgeon. Among them was the necessity of giving a statement concerning the health of a priest, Father Cambon. It is stated, concerning this matter, that:

[45] Hixosa, Francisco. Letter to Romeu, August 25, 1791, San Blas. Cal. Arch. Prov. St. Pap., vol. 12, p. 162.

"The surgeons of the Spanish navy, Don Francisco Florez Moreno, of the ship *Descubierta* on September 24, and Don Pablo Soler, resident in Monterey, with Don Juan de Dios Morelos of the packet *San Carlos* on November 18, gave certificates concerning the bad state of health of Father Pedro Benito Cambon, minister of the Mission of San Francisco, which made necessary his removal from California." [46]

In 1792 Soler is mentioned in several connections. There are two notations [47] to the effect that early in this year he sent in a list of supplies and materials which he wished to requisition from San Blas for Monterey for the year 1793. It is very probable that during the long interval since a permanent physician was at Monterey whatever medical supplies there might have been on hand were exhausted. However, the ordering of supplies was an annual affair and again in 1797 Soler is mentioned as sending in a note concerning the supplies for the next year (1798).[48] In 1792 there is also an abstract of a statement by Soler in which "he certifies that it is impossible for Manuel D. Ruiz to continue as official singer." [49] But Soler is best known at this time for his connection with the last illness and death of Governor Romeu. Hittell [50] says simply that "Arguëllo . . . on being informed of the governor's serious illness asked a certificate of the fact from Pablo Soler, physician in charge." The actual certificate was signed by both Arguëllo and Soler and read as follows:

"Don Pablo Soler, surgeon of the royal navy, resident in this royal presidio of Monterey: in virtue of the office aforementioned, certifies: that judging by the serious symptoms and loss of strength of the governor Don Josef Antonio de Romeu, his death is very near: this is according to my opinion and in conformity with the subjoined order.

signed Soler, Arguëllo" [51]

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[46] Archb. Arch., vol. 1, p. 19, September 24 and November 18, 1791. For an account of Father Cambon see Bancroft, H. H., Works, vol. 18, p. 712. From this excerpt it is quite evident that Soler must have reached Monterey prior to November 18, 1791.

[47] Cal. Arch. Prov. St. Pap. Presidios, vol. 2, p. 75, April 26, 1792, Monterey.

[48] Soler, Pablo. Letter to Manuel de Carcaba, General Treasurer, March 16, 1797, Monterey. Cal. Arch. Prov. St. Pap. Presidios, vol. 2, p. 93.

[49] Soler, Pablo, 1792, Monterey. Cal. Arch. St. Pap. Sacramento, vol. 2, p. 11.

[50] Hittell, T. H. Hist. of Cal., vol. 1, p. 546.

[51] Arguëllo, Jose, *Testimonio:* Sobre el estado alarmante del gobernador, etc. April 5, 1792, Monterey. Cal. Arch. Prov. St. Pap., vol. 22, p. 8.

As Soler predicted the governor very soon died and Soler apparently signed the death certificate and witnessed other documents. Thus in his formal notification on April 11 of the governor's death Arguëllo wrote that he signed the document " in the presence of the surgeon Don Pablo Soler and the sergeant Don Manuel de Vargas." [52]

For several years there is no mention of Soler. Then these two items appear. In 1795 when Spain went to war with France all the officers, even in remote California, were requested to contribute to its support. Soler's donation was 100 pesos.[53] In early 1797 it is stated by Hermengildo Sal that:

" He has received from the surgeon Pablo Soler 3000 pesos which are at the disposition of Lieutenant Col. Pedro Alberni." [54]

Now 3000 pesos was no small sum for a man on an annual salary of 840 pesos to hand over for any purpose, although there is no record of the reason for the transaction. Furthermore, 100 pesos as a contribution to the crown represented about 20 per cent of his salary. In fact, the whole tone of the Soler records suggests that he may have been a man of considerable means.

Before discussing the controversy concerning Soler's withdrawal from California there are a few matters of medical interest which should be mentioned. In 1797 Hermengildo Sal, commandant at Monterey, wrote to the governor relating the following event which involved the violent death of an Indian:

" The surgeon Pablo Soler states: that finding himself near the guard house around three o'clock in the afternoon of the 23rd, he became aware of a noise such as of a fight. He entered and found Choychi (the dead Indian) with a median contusion on the posterior part of the head. He also noticed that the chest cavity was seriously injured and pointed out that this Indian had two fractured ribs. . . . According to his opinion (the deceased) suffered more from the secondary contusion of the chest, than that of the head." [55]

[52] Arguëllo, Jose. Diligencia a la muerte del Gobernador, etc. April 11, 1792, Monterey. Cal. Arch. Prov. St. Pap., vol. 22, p. 7.

[53] Branciforte. Letter to Borica, June 17, 1795, Mexico City. Cal. Arch. St. Pap., Sacramento, vol. 5, p. 101.

[54] Sal, H. Letter to Borica, March 9, 1797. Cal. Arch. Prov. St. Pap., vol. 16, p. 221.

[55] Sal, H. Letter to Borica, February 23, 1797, Monterey. Cal. Arch. Prov. St. Pap., vol. 16, p. 215.

Lyman [56] states that "To Doctor Quixano belongs the honor of having performed the first recorded autopsy in California." He was referring to the Quitana case in 1812. This statement appears hardly tenable, for if Soler's examination of the dead Indian Choychi did not constitute a legally formal autopsy it certainly was the examination of a cadaver by a regularly appointed physician in order to determine the cause of death, and in this sense may be considered an autopsy. Aside from the matter of Soler, however, Dr. Lyman has neglected to consider the autopsy performed—or at least attempted—by Morelos on Father Pujol of San Diego in 1801.

In the Bancroft Biographical Notes [57] there occurs the following statement:

"Soler, Pablo. Surgeon of the Monterey Company. In April and May, 1798 he urged the necessity of vaccination and of other precautions against smallpox."

From the flattering comments made concerning him, it is probable that Soler was an excellent physician. Certainly the modern writers have been highly complimentary. But it must be remembered that the latter have derived their views partially from tradition and partially from the contemporary statements of non-medical persons, particularly priests and soldiers. Without any intention of detracting from the undoubted merits of Soler it should be pointed out that in the California of the decade 1790-1800 *any* competent, energetic physician would have made a vast impression, and in the scanty record of what Soler actually did there is nothing to indicate that he was a more outstanding physician than some who preceded or followed him.[58] After some seven or eight years of service this brillant man, whose "humanity prompted him to give his profession to

[56] Lyman, G. D. Calif. Hist. Soc. Quart., vol. 4, p. 147.

[57] Biographical Notes of H. H. Bancroft. Preserved in the Bancroft Library. The source is noted as: San Antonio, Documentos sueltos 30 and 34.

[58] Lyman (p. 146) calls him "the most noted and probably the most skillful of the Spanish-Colonial surgeon-generals in the Californias." Harris (p. 27) says he "was reputed to have been a hard-working, highly skilled physician and surgeon." Hittell (vol. 1, p. 614): ". . . the most noted and probably the best surgeon in the country during Spanish times. . . ." Lyman (p. 146) quotes a very laudatory passage from "the old Spanish Archives of the Mission San Carlos" but does not cite the exact reference.

the service of the California colony" [59] and who "gave the best years of his life for the welfare of the people" [59] became tired and wished to return to a more civilized region. To this effect he addressed a memorandum to the central government and asked to be relieved. It is highly unfortunate that this document, which existed in the California Archives, was destroyed in the San Francisco fire of 1906 and that a copy or abstract had never been made previously. Hittell saw it and used it. Bancroft's copyist also saw it but in the transcripts he made only a brief notation that "Pablo Soler insiste en irse." Lyman copies almost verbatim Hittel's version. Since the latter, then, appears the best summary available, it is worth quoting in extenso: [60]

"In 1798 he (Soler) wrote to the king, complaining of his sad and unhappy fate in being thus confined within the walls of a remote presidio surrounded by gentiles and comparatively deprived of society, and begged to be relieved. At the same time he gave an account of his services—his gratuitous attendance upon officers, missionaries, soldiers, pobladores and Indians, both gentile and Christian, when called on; his travelling sometimes as far as forty leagues to visit a sufferer and the difficult operations he had performed. In one case he had saved an Indian, who had been gored by a bull so that his entrails protruded, and in numerous cases cured severe attacks of scurvy, chronic dysentery and dropsy. He also added as a further reason for relief that his father in Spain was old, decrepit and blind, and needed the care of his only son."

Certain complications arose in conjunction with Soler's withdrawal and the securing of a successor which are reflected in the official correspondence of the period and which indicate that Soler did not immediately return to Spain, although he probably left active service in California in 1800.

According to Hittell (above) Soler petitioned the king in 1798, and this petition is the only one mentioned. However, during the same year Azanza, in Mexico City, wrote to Governor Borica, concerning the *petitions* of Soler that:

"His predecessor recommended to his majesty the petition of the surgeon Pablo Soler concerning that he might be promoted to the rank of *primeros* in the royal navy; that as yet the decision (with respect to this petition) has

[59] From the San Carlos Mission records as cited by Lyman, G. D., 1925, Calif. Hist. Soc. Quart., vol. 4, p. 146.

[60] Hittell, T. H. History of California, San Francisco, 1897, vol. 1, p. 614.

not arrived and already he is petitioning for his retirement with the enjoyment of the honors and use of the uniform of *Ayudante Consultor de aquel Real Cuerpo*; that it will be wise for this surgeon to await the decision concerning his first petition." [61]

Again the next year Soler wrote to Borica that:

"Not doubting the good will of the viceroy, he insists on his second petition, because he feels very miserable, on account of the loneliness of his life, the condition of his father, and moral ills which afflict him." [62]

It is clear therefore that Soler submitted two petitions. In the first, probably early in 1798, he requested promotion only, without retirement and in the second retirement together with promotion. This steady insistence on promotion throws a somewhat new light on the matter. It looks very much as if Soler's real reason for wishing a change rested upon ambition and a feeling that the road to advancement in the service definitely did not lie in retaining the obscure position at Monterey. In the first petition he evidently said nothing about the moral isolation of his post or the health of his father. But only a few weeks or months afterward in his second petition he adduced these reasons in support of his request for removal. By this time he must have become impatient for he did not even wait to hear the result of his first petition.

Nevertheless, at least the second petition was granted since there is a statement by the governor in August of 1800 that:

"he has received notice that a surgeon Morelos has embarked at San Blas to replace Soler." [63]

Later that year Commandant Hermengildo Sal of Monterey wrote Governor Arrillaga forwarding certain documents which "surgeon Morelos presented," one of which was an order of the viceroy dated November 14, 1799, to the effect that

"he advised the Minister at San Blas that he should inform the governor

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[61] Azanza. Letter to Borica, October 22, 1798, Mexico City. Cal. Arch. Prov. St. Pap., vol. 17, p. 186.

[62] Soler. Letter to Borica. April 10, 1799, Monterey. Cal. Arch. Prov. St. Pap., vol. 17, p. 187.

[63] Governor (Arrillaga), Letter to Commandant of Monterey, August 25, 1800. Cal. Arch. Prov. Rec., vol. 11, p. 143.

that the petition of Pablo Soler to go to practise in the kingdom (i. e., Spain) had been granted, and that Morelos was to remain in his place. . . ."[64]

Soler therefore must have left California in November-December, 1800, or shortly thereafter. However, he was not yet entirely finished with California affairs. For there exists the transcript of a letter from Carrillo at Monterey to Governor Arrillaga dated in April 1802 in which:

"he asks that surgeon Pablo Soler be prevented from undertaking his voyage to Spain until he shall have satisfied the account he has pending with the Royal Treasury."[65]

This account apparently had to do with funds which had been withheld from his pay and which Soler considered were owed to him. The matter was under discussion for some time, for on November 15, 1803 and again on March 1, 1804, the governor wrote to the viceroy that Soler was soliciting the restitution of a certain two per cent which had been collected from him, possibly through error ("*que le cobraron,*" "*que se le descontaron*"). He also requested the memoranda kept during his residence in the province.[66] Whether he ever obtained the money is not known but the incident is of interest as again emphasizing the strong pecuniary flavor of Soler's affairs. Presumably he returned to Spain sometime in 1802 or 1803.

Juan de Dios Morelos

Juan de Dios Morelos, successor to Pablo Soler was mentioned as early as 1791 (see ante) as being the surgeon of the ship *San Carlos* and as participating in the examination of Father Cambon. He evidently was a naval surgeon at that time and also in 1800 when he was on the ship *Concepcion.* He arrived at Monterey about the first of November, 1800 to relieve Soler.

The professional—and official—status of Morelos seems to have been doubtful. He evidently was the best man immediately available

[64] Sal, H. Letter to Arrillaga, November 2, 1800, Monterey. Cal. Arch. Prov. St. Pap., vol. 18, p. 29.

[65] Carrillo. Letter to Arrillaga, April 3, 1802, Monterey. Cal. Arch. Prov. St. Pap., vol. 18, p. 157.

[66] Governor (Arrillaga), to the viceroy (Borradores), November 15, 1803, and March 1, 1804. Cal. Arch. Prov. Rec., vol. 9, p. 31.

but according to one statement he was not to be given full status until "he presented the credentials of having been approved in his profession" or until the matter should be decided by the king.[67] Meanwhile he had to be supported. In 1801 Governor Arrillaga wrote to the commandant at Monterey that:

"They should provide surgeon Morelos with a moderate compensation for his subsistence, since there is no designated pay."[68]

Evidently the "moderate compensation" was not adequate because the next year Morelos himself wrote the governor asking for commutation of rations, according to the royal decree of 1797, which gave this to "provisional surgeons." He went on to say that since he was included in that category he requested that he be compensated accordingly.[69]

Provisional or not, a fully qualified M. D. or not, Morelos during his short stay of a year or two, very actively pursued the duties of the post, and is entitled to receive full recognition for his services. For he is mentioned in no less than five connections: the attack on Sal, an opinion on Alberni, the death of Sal, the death of Father Pujol, and the dedication of San Juan Bautista.

Shortly after his arrival in late 1800 he was able to save the life of Commandant Sal. Of this matter it is written:

"that the colonist (*poblador*) José Borbosa committed an assault on him (Commandant Sal) the 28th of September, and would have assassinated him but for the intervention of surgeon Juan Morelos who seized his arm and took away from him the dagger."[70]

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[67] Marquina. Letter to Arrillaga, December 5, 1800, Mexico City. Cal. Arch. St. Pap., Sacramento, vol. 9, p. 13.

[68] Arrillaga, to the Commandant at Monterey, Borrador, February 28, 1801, Loreto. Cal. Arch. Prov. Rec., vol. 11, p. 150.

[69] Morelos. Letter to Arrillaga, March 29, 1802, Monterey. Cal. Arch. Prov. St. Pap., vol. 18, p. 156.

[70] Governor Arrillaga, to the Commandant of Monterey, November 8, 1800, Loreto. Cal. Arch. Prov. Rec., vol. 11, p. 145. This passage introduces a discrepancy with respect to the time of Morelos' arrival. According to the official correspondence quoted in connection with Soler, Morelos relieved the latter about the 1st of November, 1800. This account places him as surgeon in Monterey on September 28. It is possible that Morelos arrived and took over his duties in the summer of 1800, prior to Soler's departure, or the exchange may have occurred earlier than is officially indicated. In any case he certainly assumed charge some-

The following year he was consulted with respect to the illness of Lieutenant Col. de Armas, Pedro Alberni, who was seriously ill. He diagnosed the case as pneumonia.[71] Alberni evidently survived the attack of pneumonia for he died nearly a year later (March 11, 1802) of another ailment.

Hermengildo Sal died of consumption on December 8, 1800. His death is notable and has been referred to often because of the measures taken to disinfect his property. Since, however, none of the original descriptions of this procedure have been published, it is worth while to quote at length some of the contemporary accounts. It will be noted that Morelos was consulted and that he was primarily responsible for the measures taken.

On December 12, four days after the death, Morelos reported to Carrillo as follows, saying:

"That he has received his (Carrillo's) note of that date inquiring the type of illness of which Sal died; that in answer he states it was tuberculosis; that to prevent contagion it is necessary to take certain precautions—as he has said to Commandant Alberni in answer to questions which he asked concerning the same matter; that no person shall be permitted to make use of the clothing of the deceased; that he will inspect the furniture, if he be permitted, in order to designate which pieces shall be cast into the fire; that the house shall not be inhabited by anyone until both the interior and exterior shall be cut away (*picada*), the floor scraped and the doors and windows removed."[72]

The day following the receipt of Morelos' letter Carrillo forwarded it to the governor with the following comment:

"that to avoid the spread of the disease from which Sal died . . . which according to general knowledge was tuberculosis . . . he asked the advice of the physician at the Presidio, Juan de Dios Morelos, and his (Morelos') reply will be seen in his letter. . . ."[73]

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time in 1800. (Harris, p. 24 is in error when he places Morelos' tenure as from 1801 to 1802.) Bancroft (Works, vol. 34, p. 679) erroneously ascribes the saving of Sal's life to Soler. It is quite clear from Arrillaga's letter that it was Morelos who was concerned.

[71] Arrillaga. To Commandant of Monterey, August 25, 1801, Comondú. Cal. Arch. Prov. Rec., vol. 11, p. 158.

[72] Morelos. Letter to Carillo, December 12, 1800, Monterey. Cal. Arch. Prov. St. Pap., vol. 18, p. 16.

[73] Carrillo. Letter to Arrillaga, December 13, 1800, Monterey. Cal. Arch. Prov. St. Pap., vol. 18, p. 17.

A month later Arrillaga replied to Carrillo to the effect that

"he orders him to burn to the ornaments (*alhajas*) the belongings of Sal, on account of his dying of tuberculosis, and because it is the opinion of surgeon Morelos that these measures are necessary to avoid contagion." [74]

It took the order some time to arrive and it was not until March that the destruction was finally carried out. This is shown by a letter from Arguëllo saying that:

"Under the direction of the physician Don Juan de Dios Morelos we proceeded to burn the larger part of what household furniture he had, together with all his used clothing, having segregated only the new, without any inventory, in order to exercise every care as the physician had directed." [75]

In March 1801 Father Juan Francisco Pujol died at the San Antonio Mission under peculiar circumstances. Poisoning was suspected, particularly in view of the recent illness of certain other missionaries. A group which included Morelos was sent from Monterey to investigate. What occurred is told in two quite similar contemporary accounts.

". . . Fat er Merolo, praising the virtues, religion and resignation of Father Pujc says that he was present at the demise, while Fathers Ciprés and Sitjar re ommended his soul to God. Also there did call on God for him Don José Roca . . . Don Fernando Toba . . . Don Juan Morelos, surgeon of the presidio of Monterey and various soldiers and Indians all of whom found themselves present by chance at his death, the latter because they were helping him, and the other gentlemen because they were on their way as commissioners of justice to investigate the cause of these fatal events. At three o'clock in the afternoon the surgeon opened him by order of the Sergeant who was acting as Justice, to find out if the death had been from poison. But they were able to determine only that he was (internally) already decomposed and gangrenous, for the stench which arose gave no opportunity for further (investigation). This operation completed, he was buried." [76]

"On the 19th of last March, at eight in the morning there died in the Mission of San Antonio, the Rev. Father Juan Francisco Pujol. . . . In the autopsy which was performed by the physician Don Juan Morelos on the

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[74] Arrillaga. To Commandant of Monterey (Borrador), January 13, 1801, Loreto. Cal. Arch. Prov. Rec., vol. 11, p. 149.

[75] Arguëllo, addressee unknown, March 7, 1801, Monterey. Cal. Arch. St. Pap., Sacramento, vol. 4, p. 29.

[76] San Antonio Libro de Mision. Extracts by Savage. MS. Bancr. Library, pp. 40-41, 1801.

body of the deceased, they found the intestines so very blackened and putrid that there remained no doubt that he had died of poison." [77]

Two months later the governor, in a communication to the commandant of Monterey noted that:

"... he has heard of the death, in San Antonio Mission of Father Francisco Pujol, of the San Carlos Mission ... and that it is supposed, according to the autopsy performed on the body by a physician, that he was poisoned by the Indians; that he is investigating the case and if he obtains any sure information he will punish the guilty with all severity." [78]

The brief but eventful career of Morelos drew rapidly to a close. Most writers (e. g., Bancroft, Harris) give the year 1802 as the date of the expiration of his term. However, we encounter here a somewhat confusing situation with respect to who subsequently held the position and when. This matter is best discussed in connection with the following names.

Manuel Torres and José Benites

It is stated generally that Manuel Torres served during 1802-1803 as Monterey surgeon, to be superseded by José Benites in 1803. However, it is quite doubtful if Torres ever served at all, and therefore whether his name should appear on the list. There are various reasons for such a doubt. In the first place, there is no reference whatever to any specific event or incident occurring in California with which Torres was concerned. In the second place, there is good evidence that Morelos, instead of having retired in 1802, was still acting as the surgeon of Monterey in the summer of 1803. For there is on record the statement that at the dedication of the new church at San Juan Bautista, on June 13, 1803, there was present "the surgeon of the presidio, Don Juan de Dios Morelos." [79]

In the third place, there is the official correspondence of the period, the following citations from which throw some light on the matter.

[77] Monterey, Diario, MS., p. 30. In Estudillo: Docs. para la Hist. de Calif., vol. 1, 1801.

[78] Arrillaga. To the Commandant of Monterey (Borrador), May 29, 1801, Loreto. Cal. Arch. Prov. Rec., vol. 11, p. 153.

[79] Archivo de Mision de San Juan Bautista. Extracts by Savage. MS. Bancr. Lib., p. 17. Also in Bancroft: Biog. Notes.

In November 1801 Viceroy Marquina wrote to Governor Arrillaga:

"that he has appointed as surgeon of the presidio of Monterey, with a salary of 650 pesos from his funds, Don Manuel Torres, accredited professor of the faculty, who has orders to embark for San Blas and proceed at the first opportunity to his destination; and the governor will arrange as soon as he (Torres) arrives that Morelos will return to port (i.e., San Blas) by the same ship which brings Torres who will remain to replace him." [80]

On April 24, 1802, Arrillaga transmitted these orders to Carrillo at Monterey, saying that Torres had been appointed at a salary of 650 pesos.[81] But some upset in the plans occurred. During the remainder of 1802, while we know Morelos still carried on in Monterey there is no further mention of a surgeon, but early in 1803 Arrillaga wrote de la Guerra that

"there is coming to substitute for Manuel Torres as surgeon of Monterey, José Benites." [82]

This change was substantiated and amplified in another letter from Arrillaga to de la Guerra later in the year. Arrillaga said that

"The viceroy, on April 3, told me 'that having consented to the withdrawal (*renuncia*) of Don Manuel Torres as surgeon of Monterey I have appointed in his place Don José Benites at a salary of 550 pesos'." [83]

Finally, four months later, Arrillaga wrote the viceroy that Benites had assumed his duties.[84] There is thus in the record no direct statement that Torres ever arrived in California. On the other hand, we do have evidence that Morelos still was acting as surgeon in June, 1803, and that Benites had assumed his duties in September of the same year. On the whole, therefore, it seems more consistent with the available evidence to re-cast the traditional list of Monterey surgeons by deleting the name of Manuel Torres. We would then say

[80] Marquina. Letter to Arrillaga, November 11, 1801, Mexico City. Cal. Arch. Prov. St. Pap., vol. 18, p. 144.

[81] Arrillaga. Letter to Carrillo, April 24, 1802, Loreto. Cal. Arch. Prov. St. Pap. Ben. Mil., vol. 32, p. 5.

[82] Arrillaga. Letter to de la Guerra, Jan. 15, 1803, Loreto. Cal. Arch. Prov. St. Pap. Ben. Mil., vol. 32, p. 16.

[83] Arrillaga. Letter to de la Guerra, June 15, 1803, Loreto. Cal. Arch. St. Pap., Sacramento, vol. 9, p. 101.

[84] Arrillaga. To the Viceroy (Borrador), October 29, 1803. Cal. Arch. Prov. Rec., vol. 9, p. 31. Arrillaga also wrote to the Commandant of Monterey that Benites arrived September 8, 1803 (Cal. Arch. Prov. Rec., vol. 11, p. 185).

that Morelos served from 1800 to 1803 and Benites from 1803 to 1807. This, of course, is on the basis of actual service, not technical or formal appointments.

José Benites, who held the title of "Ajudant Consultor and second surgeon of the army" [85] is known chiefly because of the report he made to the central government in Mexico concerning the state of medical practise and general health in California. This report was requested by the viceroy because of the alarming accounts which had been received regarding the decimation of the California mission Indians by disease. The text has been translated and appears elsewhere.[86] It is too long (together with the supplementary correspondence) for extensive quotation here. In brief summary it attempts to assign causes to the debilitating ailments suffered by the Indians, mentions a number of white cases which Benites has seen and ends with a plea for funds to erect a hospital. Benites also requests permission to visit the southern missions on a tour of inspection. The report as a whole was rather coldly received. The treasurer flatly negatived the idea of building a hospital on the ground of lack of funds and the Royal Medical College rather sharply criticised some of the opinions expressed by Benites. The viceroy, with a few pious expressions of benevolence turned the whole correspondence over to the Bishop of Sonora, whose ecclesiastical domain included California, and there the matter rested. The viceroy did give his consent to Benites' tour of inspection [87] but there is no record that it was ever undertaken.

One reward, of a rather mundane nature, came to Benites, possibly in appreciation of his effort to reform conditions in California. His salary was increased. Torres had been offered 650 pesos; Benites had received 550. He evidently felt that he should receive more and said so, because in November, 1804, Arrillaga wrote Benites that his salary had been increased by 350 pesos.[88] The original 550 must have been

[85] Bancroft Biog. Notes, MS. Bancr. Lib., Original reference is to the Santa Barbara Mission Book, p. 19 (1805).

[86] Cook, S. F. California's First Medical Report. California and Western Medicine. In Press.

[87] Iturrigaray. Letter to Arrillaga, June 6, 1805, Mexico City. Cal. Arch. Prov. St. Pap., vol. 19, p. 64.

[88] Arrillaga. Letter to Benites, November 15, 1804, Loreto. Cal. Arch. Prov. Rec., vol. 11, p. 193.

increased in the interim to 650 pesos because Arrillaga also wrote to de la Guerra that

"the viceroy to content surgeon José Benites, and induce him to remain in Monterey has added 350 pesos annually to the 650 which he has hitherto been receiving." [89]

However, even the munificent sum of 1000 pesos annually did not seem adequate to make Benites "contented" and by 1806 negotiations were in progress for a successor. The latter was Manuel Quijano, the last of the Monterey surgeons.

Manuel Quijano

Manuel Quijano, "a graduate of Madrid," [90] took over his office probably in early 1807 and went out of office with the Spanish administration.[91] He therefore served longer than any other surgeon, and indeed seemed to be almost the only member of the succession who really liked the position. For after his official retirement he stayed on until his death as a private practitioner.

Various items are on record with respect to the official services of Quijano. They are of the same general character as those pertaining to his predecessors—treatment of patients, opinions on epidemics, medico-legal investigations, etc., and indicate that the general routine of the Monterey surgeons was substantially the same throughout fifty years.

Vallejo relates that when Diego and Eduardo Garcia were wounded by bears they were treated by Quijano.[92] He also relates that in 1816 the first smallpox vaccine was brought to California by José Verdia. Verdia, together with a Russian physician and Quijano, vaccinated a large number of persons, particularly among the more enlightened

[89] Arrillaga. Letter to José de la Guerra, November 15, 1804, Loreto.

[90] Harris, H. Calif. Med. Story, p. 28.

[91] The records are brief regarding the exchange of Benites and Quijano. On June 30, 1806, Iturrigaray wrote to Arrillaga (Cal. Arch. Prov. St. Pap. Ben. Mil., vol. 37, p. 5) "to permit the exchange of the two surgeons, Don José Benites of New California and Don Manuel Quijano of San Blas, each one to take the salary of his new destination. . . ." On October 1, 1806, Arrillaga wrote the viceroy that Benites would retire as soon as Quijano arrived (Cal. Arch. Prov. Rec., vol. 9, p. 93). Evidently Quijano did arrive not long after and the substitution was effected.

[92] Vallejo, Mariano. Hist. de Calif., MS., vol. 1, p. 161.

class, including the entire Vallejo family.[93] When Arrillaga died in 1814, Quijano was concerned with the settlement of his estate.[94] Another official act involved testimony in a court martial in the case of José Antonio Gaviola, charged with insubordination by Lieutenant Antonio del Valle.[95]

Quijano's most outstanding single contribution, in a medical sense was, of course, his autopsy on the body of Father Quintana, of Santa Cruz. The Quintana murder case occupies a prominent position in the annals of Spanish California and in itself is a story of considerable historical as well as human interest.[96] It is not practicable to discuss the case in detail. Only a few extracts will be given in order to indicate the nature of Quijano's participation. In 1812 Father Andres Quintana of the Santa Cruz Mission was found dead under circumstances which pointed to murder, presumably by Indians. Quijano was called in to determine the cause and manner of death, even though this procedure involved an exhumation of the body.

On October 15, 1812 José Maria Estudillo, Commandant of Monterey wrote to Father Marcelino Marquinez, Minister of Santa Cruz, that

> " it is essential that surgeon Don Manuel Quijano view the remains of Father Andrés Quintana, who has been buried in the church because, as is said, he died under suspicious circumstances." [97]

The minister replied the same day " consenting to the request that the body be removed from the grave." [98] What happened is well told in the words of Alvarado:

[93] Vallejo, Mariano. Hist. de Calif., MS., vol. 4, p. 88.

[94] Quijano, M. Statement on the death of Arrillaga, August 2, 1814, Monterey. Cal. Arch. Prov. St. Pap. Ben. Mil., vol. 38, p. 16.

[95] Quijano, M. Statement. March 10, 1820, Monterey. Cal. Arch. Prov. St. Pap. Ben. Mil., vol. 51, p. 9.

[96] All the modern writers devote space to this incident and there is much material also in the contemporary documents. Among the outstanding first hand accounts may be mentioned the following: Alvarado, J. B., Historia de California, MS., vol. 1, p. 99 ff.; Vallejo, M., Historia de California, MS., vol. 2, p. 12 ff.; Galindo, E., Apuntes, etc., MS., p. 63 ff.; Amador, J. M., Memorias, etc., MS., p. 58 ff.; numerous items in the California Archives.

[97] Estudillo, J. M. Letter to Marquinez, October 15, 1812, Monterey. Santa Cruz Libro de Mision. Extracts by Savage, p. 25.

[98] Marquinez, to Estudillo, October 15, 1812. Santa Cruz Libro de Mision. Extracts by Savage, p. 25.

"Castro . . . sent to that place (Santa Cruz) Doctor Quijano whom he ordered to disinter the corpse and do an autopsy. He discovered that the death had been caused by means of injury inflicted upon the genital parts. Dr. Quijano left Castro to guard as a secret that he had discovered the cause of the death of the priest Quintana and that he was going to use every means to discover the authors of the crime. So, Senor Carlos Castro promising to do this, and not having anything more to do at Santa Cruz, he returned to Monterey where he reported to the Governor the result of his mission." [99]

It was nearly two years before the perpetrators of the crime were finally detected and caught (by Castro as a matter of fact). From their confession it was shown that Quijano's conclusions were essentially correct.

The latter part of Quijano's career was quiet. Presumably he attended to his usual duties, but aside from the items cited above there is no record of them. He may possibly have become weary of his work, for in 1818 he presented a petition "to retire from the service, with the use of the uniform" [100] but whether the petition was not granted or whether he changed his mind, it is certain that he continued at his post until the disappearance of the Spanish government abolished the position forever. He is said to have continued as nominal surgeon general for a time and still longer as a private practitioner. Both Harris and Lyman place his death in 1825 (and his final retirement in 1824) but curiously there exists a document dated in 1823 which consists of a circular letter containing a request, signed by Father Sarria that masses be said in all the missions for the soul of Manuel Quijano.[101, 102]

[99] Alvarado, J. B. Hist. de Calif., 1876, MS., vol. 1, pp. 99-100.

[100] Sola, to Viceroy (Borrador), June 5, 1818, Monterey. Cal. Arch. Prov. Rec., vol. 9, p. 195.

[101] Archivos de las Misiones. Pap. Orig., MS., vol. 1, p. 626.

[102] On page 44 was given the list of Monterey surgeons as it customarily is given. If, however, we adopt the principle that an individual should not be included if he did not actually serve at the post, but should be included if he did serve, regardless of his official status, then the list should be revised. In the light of the evidence here adduced, it should read as follows:

Pedro Prat.....1769-1771, appointed
Pedro Castan.....1774 substituted
José Dávila.....1774-1783, appointed
Pedro Carbajal.....1785 (1786?)-1787, acting unofficially
Pablo Soler.....1791-1800, appointed
Juan de Dios Morelos.....1800-1802 (1803?), acting unofficially
José Benites.. .....1803-1807, appointed
Manuel Quijano.....1807-1824 (1823?), appointed.

TEXTS AND DOCUMENTS

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More or less universal consent exists that the first book written in ancient or modern times on physiology was Galen's book on the utility of parts (*περὶ χρείας μορίων*). This is the first systematic treatise on physiology of which there is record, and the only one which man had for about fifteen centuries. René Descartes' *De homine* (1662) is usually considered the first European text on physiology, but only in the sense that it has for its subject the functions of the body. The matter is not dealt with in terms of true physiology, but is rather built up by a series of speculations unaccompanied by experimental proof. Walter Charleton's *Natural history of nutrition, life and voluntary motion* (1659) better deserves the credit of being the first book in which a new physiology based on experimental grounds was propounded.

However, no reference has been found dealing with the first book of physiology written and printed in the New World. It seems likely that a book printed in Mexico City in 1727 by Doctor Marcos José Salgado holds this place of honor.

A. *The author.* Don Marcos José Salgado was born in the city of Puebla de los Angeles in Old New Spain in 1671. After studying grammar in his home city he proceeded to the capital of the colony where he entered the Old Medical Faculty and distinguished himself by a most brilliant career. Doctor Cristobal de Vega, who taught him anatomy and surgery, said of him that "after splendidly passing from the very first intention the thresholds of both philosophy and medicine, he had turned, in giant-like manner, from the condition of pupil to that of teacher" (de Vega, 1726). Doctor Roxas, another of his teachers, wrote that when Salgado was still a very young student, his school-mates, in recognition of his wisdom and flourishing ripeness of judgment, used affectionately

to call him " old man Salgado," and that his teachers had prophesied " not in vain, that in maturity he would develop to a second Galen " (Ildephonso de Roxas, 1726).

Salgado started his teaching career in 1690-91, when he substituted temporarily for the lecturer in anatomy and surgery. From 1693 to 1697 he participated in different competitive contests instituted by the University to fill various vacant chairs. In 1697 he became regent master of the chair of *Prima,* which he occupied and held from 1722 until his death in 1740 (*El Mercurio de México,* no. 150).

This chair of *Prima de medicina* in the Old Medical Faculty of Mexico was the first where lectures on the phenomena taking place in the healthy body were delivered in the New World. In fact, its date of creation (1580) (De la Plaza y Jaen) preceded by half a century the foundation in 1628 of a similar one in the Faculty of Lima (Soldan, 1932).

B. *The book* (*Cursus medicus mexicanus*). In 1727 Salgado had issued from the press of the heirs of the widow of Michael de Rivera in Mexico City, a book of 344 pages (15 x 20.5 cm.) which he had written in Latin for the use of his students (Fig. 1). The contents were arranged to give an idea of the questions of which a regular course of that epoch were made up (See facsimile of index pages, Figs. 2-5).

Salgado promised from the first page of his book to deal with his subject " in conformity with the discoveries of the moderns, including that of the circulation of the blood." That his contemporaries granted him credit for this, is shown by what his two senior fellow-members in the Faculty wrote of him: Doctor Vega (1726) considered that Salgado " had declared war on Galen and, among the clamour of the fools, had applied to him the winnowing fork which separates chaff from corn." Doctor Roxas (1726) declared that Salgado " had imparted new radiance to the lights of Galen and Hippocrates and dissipated the dark shadows of the ancients," by taking into account " the newer and brighter lights from recent studies in science."

How far he succeeded in keeping pace with the currents of advanced thought of his time, will be appreciated by reviewing a few points of his doctrine.

a. *General ideas about the human body and its functions.* Salgado viewed the human body as "a mixture of an organic body and a rational soul" (Salgado, p. 135); classified bodily parts as in the hippocratic book, *De morbis popularibus,* in "solids and fluids" (Salgado, p. 126); and declared that the basis of their constitution was to be sought in the elements, which, "for not being sensible, no physician might hope to examine" (Salgado, p. 3). Nevertheless, the modern notion of element, propounded by Boyle (1661) escaped him entirely, and, in addition, he gave but little consideration to "the famous elements of the moderns, which are those of Descartes and those of the iatrochemists" (Salgado, p. 3). What he finally accepted were the four Aristotelian elements "air, fire, water and earth," together with the Paracelsian "principles" (Salgado, pp. 5-8). Consequently he admitted also the four Hippocratic *humours,* as made up "of different proportions either of elements or of qualities" (Salgado, p. 13).

The functions of the body which Salgado divided into vital and animal were referred by him to the play of spirits which in accordance with Galen he accepted as threefold: animal, vital and natural (Salgado, pp. 110-111). The chapter devoted to them gives us at the beginning one of the few passages in which Salgado tries to base his assertions on evidence. In support of the existence of spirits he wrote on page 110: "may we want to move the foot, the hand, or the finger, our will succeeds in doing it sustainedly. But if a ligature is placed upon the nerve extending to the part moved or felt, the operation of the said organ ceases; of which happening there may be no other reason than that the requisite for such an operation ceases to flow. And since such requisite is not obtained from the cavities within the nerves, which by its tenuity and great mobility properly deserves being named spirit" (Salgado, p. 110). It must be recognized that not only the negative fact described, but also its reference to discontinuance of the flow of something, are remarkably correct. But the nerves are neither hollow tubes, nor was there any evidence which might authorize one to suspect the nature of the propagated disturbance, which has only been known in recent years.

Furthermore, Salgado admitted, in conformity with the ancients,

that the effects upon the organs were the result, by intermediation of " faculties " (Salgado, p. 140), of the coming into play of a triple soul: " a rational soul, which thinks and is similar to the spiritual substance from which angels are made; a sensitive soul, which feels as animal brutes do; and a vegetative soul, which grows, feeds and generates the fecund seminal medium, as plants." From words like the following, it is clear that he was not quite convinced of his assertions on this particular, because he declared " incomprehensible that the soul might bring together spiritually the whole body " (Salgado, p. 136). Nevertheless, as the views in question were those maintained by the theologians, he urged their acceptance by declaring that being " in conformity with the orthodox faith from which it is not allowed to dissent it was impious and irrational to deny that body and soul are joined together by the former " (Salgado, p. 136).

b. *His teaching on circulation.* Salgado considered that blood had two kinds of motions " one alterative and fermentative, and the other local or progressive, called circular," resulting from the compression exerted upon the blood by the heart, which for this reason was to be considered " the essential motive and principle of the circulation " (Salgado, p. 184). Nevertheless, perusal of the book shows that because Salgado was so greatly influenced by the work of the ancients, he did not fully realize what the circulation of the blood really meant. In fact, only a few pages after declaring that blood is *put in motion by the heart action,* he makes the contradictory statement that if this fluid is made to circulate repeatedly through lung and heart, this was to have it submitted in these organs, to the phantastic fermentations to which Galen referred as the generation of the vital spirits, continually conveyed by the blood itself to the bodily parts to feed them, make them grow and furnish them with vitality and due heat (Salgado, p. 188). This heat, originating in the vital flame or *calido innato,* was considered responsible for keeping the " union between soul and the living parts " (Salgado, p. 34).

He also contradicted his earlier assumption that circulation of the blood was caused by the contraction of the heart, by declaring that blood was made to circulate by the suction resulting from an active

dilatation of the heart " which cause cannot be other than its *pulsating character,* consecrated by nature to its movement " (Salgado, p. 206). Thus, in this respect Salgado held ideas which Harvey a century before had shown to be contrary to scientific evidence.

From this and other passages it seems probable that Salgado never saw Harvey's work, and was forced to make only second-hand references to it. The following points permit no other conclusion: (1) his ignorance of the time-relations which Harvey (Chapt. IV) had proved to exist between auricle and ventricle, shown by his assertion that " when the auricles contract the ventricles dilate, and the opposite " (Salgado, p. 190); (2) his complete lack of references to events simultaneously occurring with the heart-beat (Harvey, Chapt. II and V); (3) his rather superficial consideration of venous circulation and the rôle played by venous valves so brilliantly dealt with by Harvey (Chapt. XIII); (4) his acceptance of the old view that the blood pumped by the heart originated in a change from ingested food, which Harvey (Chapt. VII), by means of a very simple calculation, had shown not to be true.

It would be interesting to ascertain whether the reason Salgado could not get hold of Harvey's book was the prohibition made against it by the Holy Inquisition. A book with phrases such as the one in which Harvey reported that " by placing his warm finger wet with saliva upon a motionless heart . . . this recovered life, . . . as returned from death," must have been highly suspicious for the much feared tribunal.

Another defect is further discovered in the book, which thoroughly explains why Salgado's ideas on the circulatory system were not truly modern even in his own day: he did not take into account the capillaries and capillary circulation. The quotation made by him of " Malphigi's golden treatise on visceral investigation " (Salgado, p. 69), probably indicates that, although in this case he did not lack the original source of Malphigi's great discovery, he did not realize its meaning. Capillary circulation had also been described by Leeuwenhoek from 1685 to 1718, but as his original reports appeared in Dutch, it was not to be expected that the Mexican physiologist had direct access to them.

c. *His teaching on respiration.* One may be satisfied for the

moment with some phrases of Salgado which seem to show that his idea on respiration was very close to that established by Lower (1669). In fact, on page 223 he considered that the function of the lung was " to separate from the inspired air and convey to the blood, certain nitro-saline particles, with which the air is totally besprinkled (*respersum*) and of which Dr. Mayow is a grand defender," and on pages 226-227 he added that from this mixing " the blood turned in the lung to a scarlet colour and was made thinner and more fluid." Nevertheless, while writing these phrases, Salgado remained quite unconcerned about what they really meant. If he could not see the new meaning of the respiratory function, this was simply because he did not realize that nitro-saline particles had been shown by Lower to be essential to life. Instead, he did away with them by declaring them a " very beautiful novelty, quite unnecessary for his plans " (Salgado, p. 223).

By not seizing this opportunity for new ideas, Salgado fell into complete accord with the ancients, and assigned to respiration no less than eight finalities, which it will be of interest to recapitulate, as an illustration of the teleological turn of mind which was prevalent in his time. He wrote that respiration served "(1) for olfaction; (2) for excretion of sooty or fuliginous parts of blood (p. 116); (3) for expectoration, yawning, coughing and sneezing; (4) for sipping liquids; (5) for softly and regularly pushing the faeces to their places, the intestine and bladder, and when more vehement and forced, to help the expulsion of foetus and secundine; (6) to evoke uninterrupted, frequent movements of the thorax, and the ascent and descent of diaphragm, which are responsible for the movements in the abdominal viscera; (7) to promote transpiration over the whole body, by making the surrounding air pervade the whole body through arteries and veins; (8) to impart the scarlet colour, tenuity and fluidity caused by nitro-aerial particles to blood " (Salgado, pp. 226-227).

Furthermore, he admitted that respiration served the purpose of " moderating the native heat, to prevent the excessive ignition of the blood " (p. 225). On earlier pages he had shown nonconformity with the old doctrine of the *vital flame* and declared it " intricate and abstruse " (p. 31), but here he is so completely domi-

nated by tradition that he wrote: "this use for refrigeration, soundly understood, cannot be boldly denied" (p. 225), and "what must convince us the best about this utility, is that Willis, Sylvius and other brilliant authors admit the vital flame in the heart."

It is interesting to discover that Salgado thought that "respiration served to move the chest," instead of thinking that the chest movements draw air into the lungs in order that the external changes of respiration take place. This is again because he could not help being swayed by the mode of his day. Despite his faint efforts to oppose the old doctrine by declaring that "it was difficult to understand," he accepted as cause for the thoracic movements "the air which dilated within the chest" (p. 228). It is obvious that in this particular, Salgado remained in the same attitude of mind described by Harvey for "almost every anatomist, physician and philosopher," of his day, who "thought that pulse and respiration behaved in the same way from the point of view of movement" (Harvey, Introduction).

d. *Digestion and nutrition.* As this department of physiology did not exist until modern chemistry began to develop, Salgado necessarily could offer in this connection only the vague notions of mediaeval alchemy. He made in his descriptions repeated use of the terms "coction" and "fermentation," but it must be remembered that, although currently used by authors, both lacked definite meaning.

For Salgado nutrition was the result of three "coctions": "a first one which takes place in the stomach and transforms food into a new substance called chyle; a second and more principal one, referred by the ancients to the liver, . . . which changes at least the greater part of chyle into blood and for this is called sanguification, and a third one, occurring in the left ventricle, where chyle is vivified by its contact with air and deserves more properly to be called blood" (Salgado, pp. 52 and 240).

The first coction was considered to have "for its main instrument the juice or ferment of the stomach" (p. 82). The other digestive secretions were declared to exert merely complementary actions. Bile was proclaimed to "excite smoothly in chyle that fermentation which separates from food its finer particles, while the

others are precipitated downwards with the intestinal residua" (p. 73). Of pancreatic juice he said that it "perfects and separates the chyle but without precipitating earthy excrements," as explained of bile (p. 75). To saliva he attributed the use of "wetting the rough artery," and a certain "fermentative force" to which he referred the contagious nature of many diseases, as venereal lues. scurvy and others (p. 83).

Salgado thought he made a definite advance upon Galen by displacing the process of sanguification from the liver to the left ventricle, but as he did not produce any evidence in support of his new supposition, this had no greater value than the other superstitions of the ancients.

e. *Muscular activity.* It was still currently accepted when Salgado wrote his book that animal spirits played an important part in muscular contraction. Nevertheless, Borelli (1680) in his famous book, *De motu animalium,* had already called attention to the importance of equally taking into consideration other factors existing in the muscles themselves. But Salgado either was not informed, or did not realize the importance of this work, as can be appreciated by his own words on the causes of contraction, which he declared to be: "(1) a spontaneous tendency to contract; (2) animal impulses radiating through nerves which upon their arrival at muscle fibres, make them swell and shorten; (3) . . . a bigger afflux of arterial blood, which upon inundating the belly of the muscle and enlarging its capacity, produces its vigor and turgor" (Salgado, p. 286).

It may be said in this connection that the increase of muscle volume during contraction, considered in his second and third suppositions, had already been proved false by Glisson (1677).

In support of the third cause, Salgado afforded another of the few correctly observed facts which he presents only from time to time in the book "That when movement of the blood towards a muscle is interrupted by putting a ligature on its artery, the movement in the muscle diminishes and even disappears" (p. 236). The fact is still true, but the interpretation false.

f. *On the nervous system.* Salgado was thoroughly conservative in his doctrine on the nervous system. He admitted that the func-

tions of the nerves "especially of those for the senses and movement," were due "to the animal spirits, immediate tools of soul, which are generated in the brain from the more spirituous and thinner part of blood, perhaps not by simple segregation, but by addition of a ferment" (p. 215).

Differences between the actions exerted by nerves upon the various organs, were referred by him to differences in the disposition and properties of these. Consequently, he wrote: "it is the same spirit which engenders visions in the eye and movement in muscle; which agitated in orderly and moderate movement makes the brain expand,* and which is carried away from this by the filaments of the brain cord as rivulets flowing to all the bodily parts" (p. 215).

His ideas about the generation of animal spirits led him to the phantastic speculation that they might take origin from "a fraction of the inspired air which could reach the brain through the nose" (p. 117).

Salgado made a curious distinction between the voluntary and involuntary function of nerves: "The spirits and nerves originated in the brain serve for voluntary motion depending on the soul's command, as well as for the use of the senses. As to the spirits and nerves coming out of the cerebellum, it is permissible to think that they are the instruments for spontaneous or natural motion, as is evidenced in pulse, respiration, and all inner viscera, which move not only without our thinking of it, but while we sleep" (p. 113). It seems to me that Salgado based this assertion on anatomical evidence from Willis (1680, p. 124).

Descartes' book, *De homine* (1662), which might be expected to have exerted some influence upon Salgado's ideas on the functions of the central nervous system and sense organs, is only briefly quoted in connection with the causes of "flavours" (Salgado, p. 148).

* * * *

Upon the foregoing analysis it is possible to pass judgment both upon Salgado and his book.

The tremendous courage he had to write in his time and environ-

* Perhaps a reference to brain pulsation.

ment a book on physiology; the high opinions which his teachers and contemporaries held of him; his feeling of nonconformity with the routine doctrines of his day, and his efforts to change them by taking into consideration modern contributions to his science, are all signs which indicate that Salgado was a real character, with a vigorous mind.

Nevertheless, it must be recognized that, in spite of all this, his good intentions were overwhelmed by the absolute subjection to the ancients in the environment in which he lived, and perhaps by the impossibility of getting all the contemporary sources of information he needed for his purpose. At the end, his mind only reflected the teleological scholasticism of his days, and the only quotations he made from his contemporaries were speculations tending to show that the ancients were right.

In connection with experimentation, Salgado showed from the very first page of his book that he had no real appreciation of it. He admitted, indeed, that "reason and experience are to be preferred to any author's views," but added immediately that "not all experiments convince reason," but many are "uncertain and extremely dangerous" (p. 1), as warned in Hippocrates I *Aphorism.*

At the time Salgado lived a renascent movement towards Hippocratic methods had been started after Sydenham and Boerhaave, but this influence did not reach the Old Medical Faculty of Mexico until nearly the end of the next century (Izquierdo, 1934).

Salgado's book was still being used by the medical students at the University of Mexico half a century after the author's death. However, Father Alzate narrates that in 1793 Doctor Bartolache upon taking possession of the chair of Prima, declared "barbarous" this and other books and fought them off (Alzate, 1793).

Although Salgado's book failed to reflect the spirit of the new physiology, which had come to life after Harvey (1628), it is very probable that it was the *first book on physiology,* written and printed in the New World.

It seems that the second book on physiology published in the New World, was a much less extensive work (90 pages, 16°) written by Isaac Ball (Fig. 6). According to Mr. D. Mayer of the Staff of the War Department Library, Washington, for whose

opinion I am indebted to my friend Major Edgar Erskine Hume, Ball's book, mainly written for the students of Columbia College in New York, was intended also for the general public. Therefore, its character was more that of a rather popular-scientific volume than of pure science.

It is a pleasure to express my indebtedness to Doctor John F. Fulton for reading and criticizing this manuscript before publication.

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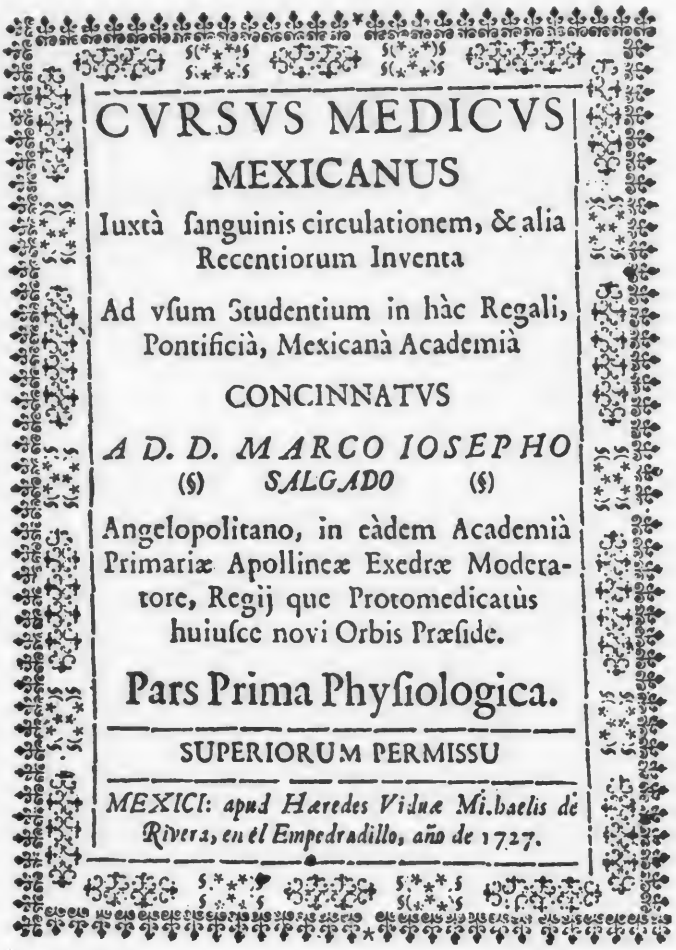
CVRSVS MEDICVS
MEXICANUS
Iuxtà ſanguinis circulationem, & alia Recentiorum Inventa
Ad vſum Studentium in hàc Regali, Pontificià, Mexicanà Academià
CONCINNATVS
A D. D. MARCO IOSEPHO
(§) SALGADO (§)
Angelopolitano, in eàdem Academià Primariæ Apollineæ Exedræ Moderatore, Regij que Protomedicatùs huiuſce novi Orbis Præſide.
Pars Prima Phyſiologica.
SUPERIORUM PERMISSU
MEXICI: apud Hæredes Viduæ Michaelis de Rivera, en el Empedradillo, año de 1727.

FIGURE 1.

Title of *Cursus medicus mexicanus*, 1727.

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Index pages of Salgado's *Cursus medicus mexicanus.*

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FINIS.

TRACT.

FIGURE 5.

Index pages of Salgado's *Cursus medicus mexicanus.*

AN

ANALYTICAL VIEW

OF

THE ANIMAL ECONOMY.

CALCULATED FOR

THE STUDENTS OF MEDICINE,

AS WELL AS

PRIVATE GENTLEMEN

INTERSPERSED WITH

MANY ALLEGORIES, AND MORAL REFLECTIONS,

DRAWN FROM THE SUBJECT,

TO

AWAKEN THE MIND TO AN ELEVATED SENSE

OF THE

GREAT AUTHOR OF NATURE.

BY ISAAC BALL,

PHYSICIAN AND SURGEON, AND DIPLOMATIC MEMBER OF THE MEDICAL SOCIETY OF THE CITY AND COUNTY OF NEW-YORK

Quum nobis denegatur diu vivere, aliquid relinquamus quod nos vixisse testetur.

Since it is denied us to live long, let us do something which may prove that we have lived.

THE SECOND EDITION, WITH LARGE ADDITIONS

New-York:

PRINTED FOR THE AUTHOR,

BY SAMUEL WOOD.

1808.

FIGURE 6.

Title-page of Ball's *Animal economy*, 1808.

WILLIAM OSLER'S FIRST PRINTED PAPER

Dr. Henry R. Viets, in Boston, recently acquired a copy of vol. 44 of *Hardwicke's Science-Gossip* published in London, 1870, (fig. 1) that contains Osler's first printed paper, " Christmas and the Microscope " (fig. 2). It was written by Osler in his early student days and gives evidence of his keen interest in nature. The circumstances under which the article was written are discussed by Harvey Cushing, *The Life of Sir William Osler*, Oxford, 1925, vol. 1, pp. 55-56.

H. E. S.

HARDWICKE'S

Science-Gossip:

AN ILLUSTRATED MEDIUM OF INTERCHANGE AND GOSSIP

FOR STUDENTS AND

LOVERS OF NATURE.

EDITED BY M. C. COOKE,

AUTHOR OF "A PLAIN AND EASY ACCOUNT OF THE BRITISH FUNGI," "MICROSCOPIC FUNGI," "A MANUAL OF BOTANICAL TERMS," AND OF "STRUCTURAL BOTANY," THE "BRITISH REPTILES," ETC. ETC.

LONDON:

ROBERT HARDWICKE, 192, PICCADILLY.

1870.

FIG. 1

MICROSCOPY.

CHRISTMAS AND THE MICROSCOPE.—

Nec jam sustinebant onus,
Sylvæ laborantes, geluque
Flumina constiterint acuto,

might well be said of Canadian woods and streams at this season of the year. The earth has put on her winter robes, and under them she hides most of those objects which in summer please and delight us so much. A cheerless prospect for microscopists, one would think. So I thought, as on Christmas afternoon I sallied out with bottles and stick in search of diatoms, infusoria, snow-peas, &c., though I did not expect to be very successful. After wandering about for some time, searching vainly for an unfrozen stream, I was about to return home with empty bottles, when I suddenly bethought myself of an old spring which supplied several families with water, and which I knew therefore would be unfrozen. In this country, wherever there is a good spring some kind individual sinks a barrel for the benefit of the community at large, and thereby benefits microscopists in no small degree, for in these you are generally sure to find a good supply of microscopic objects. When I got to the spring the first thing that greeted my sight was a piece of algæ floating on the top of the water, and on a closer examination of the barrel I saw that the sides had a dark-brown coating, in which I knew diatoms and infusoria would be found. Scraping some of this off, I placed it in a bottle and retraced my steps homeward, well satisfied with my afternoon's walk. Getting home at that unfavourable time for working, just as the light is beginning to fail, I had to exercise my patience and wait till evening to see what my bottle contained. I had not long to wait, as darkness soon succeeds the light here: so when I had got a lamp lighted, I proceeded to examine my spoils. A short account of the things I found may not be uninteresting to English readers of the SCIENCE-GOSSIP, as it will give them some idea of what lovers of science meet with in this country. Upon putting a slide under the microscope before I had it properly focussed, I saw the dim outline of some little creature kicking and struggling as though it were caught in a net. It turned out to be one of the Tardigrada, or little water-bears, that had got its feet entangled in the gelatinous tube of the *Encyonema prostratum*. It was with great difficulty that it freed itself from the jelly, and then it began its slow and stately walk, which formed such a contrast with the quick, lively movements of the animalcules with which it was surrounded. The little water-bears are by no means common objects with us, but it only makes them the more acceptable when we chance to get them. The *Encyonema prostratum* seems to delight in these quiet water-barrels, though it is occasionally found on the wave-washed Cladophora of our lakes. They always remind me of the manner in which peccaries sleep, packed closely together in hollow logs. I have seen the *Encyonema* shoot out of its tube, but whether it can find its way back again or not I do not know. Two species of *Euglenæ* were very plentiful, viz., the *E. viridis* and *E. acus*. They are found here in the spring in such numbers as to give to the water they are in a dark green colour. The *Paramecium aurelia* and *Kolpoda cucullus* were in great abundance. Among other Infusoria were the *Amphileptus anser*, two species of *Vorticellinæ* and the *Lercophrys patula*. Of Desmids there were three species: *Closterium acerosum*, *Cosmarium undulatum*, and *Scenedesmus quadricauda*. Of Diatoms, besides the *Encyonema*, the following species were present: *Gomphonema coronatum*, *G. minutissimum*, *Melosira varians* (Thwaites), *Fragillaria rhabdosoma*, *Meridion vernale*, *Navicula amphirhynchus*, *N. librile*, *Hyalonira rectangula*, *Synedra splendens*, *Cymbella gastroides*, and some others.—*W. Osler, Dundas, Ontario.*

OBJECT FOR POLARISCOPE.—The skin and scales covering the legs of a pheasant make a very pretty object for the polariscope. The scales should be cleared from fat by immersion in ether or dilute liquor potassæ, dried between slips of glass, soaked in turpentine until quite transparent, and finally mounted in balsam. The colours are very bright if a selenite stage is used.—*J. H., Cheltenham.*

CORDYLOPHORA LACUSTRIS.—The only habitats I find recorded for this interesting zoophyte are docks in London and Dublin, where there would, I suppose, be some admixture of salt water sometimes, though Professor Allmann says he kept specimens for a fortnight in fresh water. Last June a specimen was found by a friend of mine on a piece of old canal-boat, which we were examining for polyzoa, lying on the Birmingham Canal at Tipton. I subsequently found this zoophyte in the Stourbridge Canal, close by the town; and I also obtained a luxurious gathering from a pool near Pensnett, Dudley, where it was lying close to the side, attached to a small stick, and exposed to the full glare of the August sun. I transferred this colony to my aquarium, where it is still (Nov. 16) flourishing. The zoophyte does not seem therefore to avoid light, though, I suppose, when so exposed, it is frequently destroyed by the more rapid growth of Confervæ. Johnston only gives a short account of it in his 2nd edition, and derives the name from κόρδυλος (a water-newt) instead of κορύνη (*clava*, a club).—(*See* Professor Allmann's admirable paper in *Philosophical Transactions*, 1853.) An interesting account of it also, by the Rev. T. Hincks, is to be found in *Ann. and Mag. Nat. History*, 1853.—*W. Madeley, Pensnett, near Dudley.*

FIG. 2

TWO LETTERS OF SIR WILLIAM OSLER

MARY LOUISE MARSHALL

The Tulane University School of Medicine,
New Orleans

In 1914, Dr. Edmond Souchon, Professor Emeritus of Anatomy, Tulane University, began the collection of data for a paper to be entitled Original Contributions of America to Medical Sciences. He addressed the following form letter to a long list of prominent physicians of that day,—

Nov. 1, 1914.

Dear Doctor:-

I am writing a paper on *Original Contributions of America to Medical Sciences.*

Kindly send me the *titles* of your *original* contributions and also the *titles* of *original* work done by others in America.

If you can think of anyone who could help me in this matter, please send me his name and address.

Yours truly,

ED. SOUCHON, M. D.
Professor Emeritus of Anatomy,
Tulane School of Medicine.

One of these letters was addressed to Sir William Osler, Regius Professor of Medicine at Oxford University, evidently on the basis of his former association with Johns Hopkins University. Dr. Osler's answer is shown in Figure 1, and is of particular interest in giving his own appraisal of his original contributions to the advancement of medical science.

A second letter was sent out on January 1, 1915 to explain in greater detail what had been meant by the term "original."

Jan. 1, 1915.

Dear Doctor;

By *original* contributions is meant something new that has not been done before by somebody else.

Kindly send me the titles of your *Original* contributions and oblige,—

Yours truly,

Ed. Souchon, M. D.

This brought Dr. Osler's reply as shown in Figure 2, breathing the spirit of modesty achieved only by the truly great.

These letters, and many others received by Dr. Souchon during his work on this paper have come to light only this fall, in an old correspondence file. They have become treasures of the Tulane University School of Medicine.

Dr. Souchon's article was published in the Transactions of the American Surgical Association 35:65-171. 1917. His reference to "Dr. William Osler (Baltimore)," which follows that on Dr. W. H. Welch says that Dr. Osler "is also a great educator and leader of men and thought. He has also contributed to the glory of Johns Hopkins."

From the Regius Professor of Medicine, Oxford.

4, December, 1914.

Dear Suchon,

Garrison, at the Surgeon General's Library, is the man you would find most helpful; and his books on the History of Medicine is a perfect storehouse, and the section on the History of Medicine in the Index Catalogue.

The only contributions of mine that are worth mentioning are:-

(1) The determination of the blood platelets as separate elements in the circulation. (Proceedings of the Royal Society, 1874.)

(2) The work done by myself and my students, particularly Thayer, MacCallum and Lazear, in connection with malarial parasites.

(3) The work helping to place amoebic dysentery on a pathological and clinical foundation.

(4) The full clinical description of the polycythemia rubra, or erythremia.

(5) The description of hereditary telangiectasis with epistaxis.

(6) The clinical descriptions of the visceral types of purpura and angio-neurotic-oedema.

I came across your aneurism paper the other day, and looked it over with great interest.

Sincerely yours,

Wm Osler

FIG. 1

From the Regius Professor of Medicine, Oxford.

19, January, 1915.

Dear Souchon,

I do not think I have ever done anything that has not been done by someone previously, often very much better. One picks up a brick or two and carries it to the common edifice, but I have only been a hod carrier and do not come into class with the great architects of the whole building, or even with the designers and decorators of the halls and rooms.

With greetings and regards,

Sincerely yours,

W. Osler

FIG. 2

MEDICO-HISTORICAL ACTIVITIES IN THE UNITED STATES

DISTRICT OF COLUMBIA

The George Washington University, WASHINGTON

An informal Seminar on the History of Science is conducted by a group of Scholars the second Tuesday evening of each month in Building C (2029 G Street, N. W.), room 205, at 8.10 p. m. This year the special topic for discussion is "Colonial Scientific Thought."

The subject discussed on November 10th was

"European Sources of Colonial Science." Leader: Professor Wood Gray, Department of History, G. W. U.

The discussion followed the presentation of four short papers on

"René Descartes," by Professor Christopher Garnett, Department of Philosophy, G. W. U.

"William Harvey," by Mr. Morris Leikind, Library of Congress.

"Robert Boyle," by Professor Colin Mackall, Department of Chemistry, G. W. U.

"Isaac Newton," by Mr. Frederick E. Brasch, Smithsonian Division, Library of Congress.

The following meetings will be devoted to the development of individual sciences.

CONNECTICUT

The Beaumont Medical Club, NEW HAVEN

The fifth Carmalt Lecture was given by Professor D'Arcy Wentworth Thompson of the University of St. Andrews on Thursday, November 12, 1936 at the Sterling Auditorium in the Yale School of Medicine at 8.30 p. m. The subject was "Aristotle as a Biologist."

The forty-ninth meeting of the Beaumont Medical Club was held in the Yale University Library, Friday, December 11, 1936 at 5 p. m. The paper of the afternoon was presented by Dr. Walter R. Steiner, "The United States Sanitary Commission and a Physician's Experiences in it during the Civil War."

LOUISIANA

1. *Medical History Activities in New Orleans.*

Under the auspices of the Medhistophilic Club, and the History of Medicine Society at Tulane University, Dr. Henry E. Sigerist gave a series of three lectures:

1. The History of the Concept of Disease.
2. The Rise of Anatomy.
3. The Activities of the Institute of Medical History at Hopkins, and Researches in Early Mediaeval Medicine.

A fourth lecture was given before the Swiss-American Historical Society on "Contributions of Switzerland to Medicine."

2. *History of Medicine Society of Tulane.*

The following series of bi-monthly lectures has been planned for the 1936-37 session:

"Charles Richet," Professor Harold Cummins
"The Diary of a Student at Tulane in 1850." Miss M. L. Marshall
"Medicine in the Bible," Dr. O. W. Bethea
"Gadgets in Medicine," Dr. Roy H. Turner
"Dwarfs in Medicine and Art," Dr. I. I. Lemann
"Weir Mitchell," Dr. J. H. Musser
"Christian Fenger," Dr. Alton Ochsner
"Egyptian Medicine," Dr. E. C. Faust
"Dr. Stanford Chaille," Dr. Chaille Jamison
"Abraham Jacobi," Dr. Robert Strong
"Noguchi," Dr. Charles F. Craig
"Helmholtz," Professor H. S. Mayerson
"History of the Therapy of Pulmonary Tuberculosis," Dr. S. Jacobs
"Plantation Medicine," Miss M. L. Marshall
"New Orleans Medicine," Dr. A. E. Fossier
"The History of Caesarian Section," Dr. George Mayer

3. *Medhistophilic Club.*

This dinner group, meeting once a month, has planned the following series:

"The History of Certain Instruments of Precision in Medicine," Sam Haigler
"Comments on the History of Orthopedic Surgery," Irving Cahen
"John Murphy," Gordon Holcombe
"The History of Syphilis," Robert Munger

"Medical Poets," B. Bernard Weinstein
"Highlights in the History of Thyroid Disease," Sam Nadler

Four other papers, the titles as yet undetermined, will be given by Paul Kurzweg, Joel Dawson, Thomas Gladney and Bradley Brownson.

B. B. WEINSTEIN.

NEW HAMPSHIRE

Medical History Club, CONCORD

"Our Medical History Club is a recent organization and came into life in June, 1936. The objective of the Club is to stimulate interest in medical history in the physicians of the state, and the membership is open to any physician interested in the subject. The meetings are held on the second Tuesday of each month, with the exception of the summer months of July and August, at the State Hospital in Concord, New Hampshire. Our attendance usually varies between twenty and thirty, depending on the climatic conditions, holidays and other unforeseen factors. Our program is so arranged that half of the papers are contributed by guest speakers, and the other half by members of the Club. Dr. Chancey Adams of Concord, New Hampshire, was the first speaker, and he addressed the Club in June, 1936 on 'The Practice of Medicine in Concord before 1900.' In September Dr. Merrill Moore of Boston spoke on 'The Historical Aspect of Neurosyphilis.' Dr. John Proctor of Concord addressed us in October on 'The Dartmouth Medical School: The First Hundred Years.' In November Dr. Henry Viets of Boston spoke on 'Thomas Thatcher: A Brief Rule.' The topic of December is 'Psychiatry and the Renaissance,' by Dr. Stone of Concord.

"We expect that our membership is going to increase as soon as the objectives of the Club become better known in the state, but for the present our aim is to develop interest in medical history in a small but devoted group of physicians, which would serve as a nucleus for a larger organization later on."

S. STONE.

NEW YORK

Metropolitan Life Insurance Company of New York, NEW YORK

A group of librarians of the Metropolitan Life Insurance Company is meeting every month to report interesting material in medical history or to make suggestions for further research. The members of the group have applied for membership in the American Association of History of Medicine.

The University of Rochester School of Medicine and Dentistry, ROCHESTER

Medical History Club

The meetings of the Medical History Club included the following programs:

September 28, 1936

"A Medical Mystery of the Thirteenth Century and its Twentieth Century Solution," Dr. George W. Corner

"Resurrection Days," Dr. Elbert B. Ruth

October 26, 1936

"Exhibition of Old Dental Instruments," Dr. M. W. McCrea

"Salernitan Surgery in the Twelfth Century" (Illustrated), Dr. George W. Corner

OHIO

Western Reserve University School of Medicine, CLEVELAND

Historical Aspects of Medicine

Primarily for first year medical students, but all interested are invited.

Date	*Subject*	*Speaker*
November 24th	Medicine in Ancient Times	Dr. Todd
December 1st	Medicine in Mediaeval Times	Dr. Karsner
December 8th	Medicine Since the Renaissance	Dr. Goldblatt
December 15th	Medical Education in the United States and Early History of Western Reserve School of Medicine	Dr. Waite
January 5th	Rise of Preventive Medicine	Dr. Doull
January 12th	Development of Clinical Surgery	Dr. Lenhart
January 19th	Development of Clinical Medicine	Dr. Wearn
January 26th	Influence of Chemistry on the History of Scientific Medicine	Dr. Myers

All lectures will be given in the Institute of Pathology and will commence promptly at 5.00 p. m.

MARYLAND

UNIVERSITY OF MARYLAND, BALTIMORE

University of Maryland Medical Forum

"Our time is distinguished by a more complete synthesis of human activities along readily perceivable, rational lines. The dominant trend

of modern thought is toward the amalgamation of particular disciplines, toward the borrowing, relating, correlating of the observations and truths of individual experience into humanly comprehensible, utilizable knowledge. In medicine this means that even the most highly specific, most individual of services, cannot be but enriched by close association with the social sciences; the doctor, as a syphilologist, must study marital morality; as an epidemiologist he must be conversant with the sanitary structure of his community; as a student of mental hygiene he must find social causation in mental disease. There is no portion of medicine that can wisely be organology without at the same time being systematology; there cannot be a rational treatment of diseased man without consideration of the agency and social modes of his affliction. Medical philosophy appreciates this fact, practical medicine ignores it. Medical theoreticians speak about the dawn of preventive medicine, yet medical service remains a curative function. Knowing, as we do then, the lapse between medical usage and medical theory, we welcome every sign that points toward a more vital realization of medical practice. That this movement is taking place is indicated by the nation-wide creation of medical school discussion groups, where socially applicable, medical pertinent subjects are seriously considered.

"The latest of these student lecture groups is the *University of Maryland Medical Forum.* It was formed by the general student body for the purpose of enlarging, more clearly defining their position as doctors in a complex social environment. This they hope to accomplish by hearing and discussing the work of prominent, representative sanitary engineers, mental hygienists, medical historians, industrial physicians, penologists, housing experts, biostatistician, birth control experts, etc. At the first program Dr. R. A. Vonderlehr, Assistant Surgeon General of the United States Public Health Service spoke on 'The Social and Medical Aspects of Syphilis.' Dr. Raymond Pearl, Professor of Biology of the Johns Hopkins School of Hygiene and Public Health, addressed the second meeting of the Forum. His subject was 'Some Social Implications Of Population Trends.' Future meetings of the Forum will be held Friday evenings, at monthly intervals."

ALVIN MEYER.

THE JOHNS HOPKINS UNIVERSITY, BALTIMORE

Institute of the History of Medicine

The academic year is in full swing. The Research Seminar devoted October and November to a discussion of Arabic Medicine whereby Dr. Temkin reviewed the contributions made to the subject during the last ten years. On December 3rd Professor Loren C. MacKinney spoke on his medical researches in French Libraries. December and January are

being devoted to a discussion of Maya Medicine, Dr. Elizabeth Stewart presenting the results of her research in this field.

Besides the lectures mentioned above, Dr. Henry E. Sigerist delivered the following addresses:

August 29th—Annual meeting of the Swiss Society of the History of Medicine and Science, in Solothurn, Switzerland, "Die Pflege der Naturwissenschaftsgeschichte in der Sowjet-Union."

October 19th—New York Academy of Medicine, The Wesley M. Carpenter Lecture: "Historical Background of Industrial and Occupational Diseases."

November 5th—Social Problems Forum of Johns Hopkins University School of Medicine: "Russia in 1936."

November 6th—Annual meeting of the Friends of the Library of the College of Physicians in Philadelphia: "Civilization and Disease."

November 23rd—New York Chapter of Phi Beta Kappa: "The Social History of Medicine."

December 11th—The William Harvey Society of Tufts Medical College in Boston: "The Social and Economic Problems of Medicine."

December 14th—The Medical Economics and Social Problems Forum of New York University, College of Medicine: "Medicine and the Social Sciences."

December 17th—The Albert Berney Lecture, Sinai Hospital, Baltimore: "The Interrelationship between Civilization and Disease."

Mr. Roger S. Greene presented the Library with a Japanese copy of the Life of Takano Nagahide by Osada Gonjiro, Tokyo, 1899, and with a copy of the English translation of this book by D. C. Greene.

Dr. Allen W. Freeman presented the Library with a copy of "Cronica de la Real y Pontificia Universidad de Mexico escrita en el siglo XVII por el bachiller Cristobal Bernardo de la Plaza y Jaen, 2 vol., Mexico, 1931."

The Hideyo Noguchi Lectures

The fifth course of the Hideyo Noguchi Lectures was given by Professor Loren C. MacKinney, of the University of North Carolina, the general subject being "*The Dark Age of Medicine in France.*" The individual lectures dealt with the following:

November 30th—"The Dark-Age Concept and Early Mediaeval Medicine."

December 2nd—"Medicine in Merovingian and Carolingian France."

December 4th—"Medical Progress at Chartres and other French Centers in the Tenth and Eleventh Centuries."

The lectures will be published as Volume III of the Hideyo Noguchi Lecture Series.

The Johns Hopkins Medical History Club

On November 9th the committee of the Johns Hopkins Medical History Club, the committee of the Osler Historical Society and representatives of the University of Maryland held a joint meeting at the 14 West Hamilton Street Club to discuss coordinating the activities of the various medical history organizations in Baltimore. It was decided that in the future the Johns Hopkins Medical History Club will hold three and the Osler Historical Society two meetings during the year, while both groups together will have one joint meeting at the University of Maryland. In addition, one meeting will take place every year under the auspices of the Washington-Baltimore chapter of the History of Science Society. In this way collisions will be avoided and close cooperation between the various groups will be secured. It was decided that the committees should meet at the end of each year to decide upon the program for the coming year.

The Johns Hopkins Medical History Club held its first meeting on November 13th. It was preceded by a dinner in the Welch Medical Library in honor of the two guests, Sir Humphry Rolleston and Major General C. R. Reynolds. The program was:

"One Hundred Years of the Army Medical Library," Major General C. R. Reynolds

"Medical Eponyms," Sir Humphry Rolleston

A reception was held after the meeting in the Great Hall.

The Social Problems Forum

The Social Problems Forum so far has held two meetings both of which were very well attended. On November 5th Dr. Sigerist discussed "Russia in 1936" and on December 18th Dr. Albert Blumberg spoke on "The Spanish Civil War—Will It Become Another European War?"

MEDICAL CHIRURGICAL FACULTY, BALTIMORE

The Osler Historical Society

The first meeting of the year was held on December 18th. The program included the following papers:

"Medical Bookplates," Dr. Morris Fishbein

"Case Reports of Dr. Philip Syng Physick at the Pennsylvania Hospital," Dr. Francis R. Packard

H. E. S.